

MAKERERE  **UNIVERSITY**

**COLLEGE OF COMPUTING AND INFORMATION SCIENCES
EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCES**

**AN AUTOMATED RECORDS SYSTEM FOR THE MINISTRY OF
HEALTH CENTRAL REGISTRY.**

By

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**A RESEARCH PROPOSAL SUBMITTED TO THE COLLEGE OF COMPUTING
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AWARD OF THE DEGREE OF BACHELOR OF RECORDS AND ARCHIVES
MANAGEMENT OF MAKERERE UNIVERSITY**

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DECLARATION

We hereby declare that the work contained in this project proposal is our own original work except where references have been cited and that it has not previously in its entirety or in part been submitted to any University for any academic award.

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APPROVAL

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LIST OF ACRONYMS / ABBREVIATIONS

EMR	Electronic Management of Records
ARO	Assistant Records Officer
BRAM	Bachelor of Records and Archives Management
MOH	Ministry of Health
HRIO	Health Records and Information Officer
HRO	Human Resource Officer
RO	Records Officer
SRO	Senior Records Officer
NDC	National Disease Control
PCA	Persons on Contract
PS	Permanent Secretary
LAS	Lay Staff
FIN	Finance
PRO	Principle Records Officer
ADM	Administration
NS	Nurses
PARA	Paramedicals
DGHS	Director General Health Service
ARO	Assistant Records Officer
EDMS	Electronic Document Management System
EDRMS	Electronic Document and Record Management System
HOD	Head of Department
HR	Human Resource
ISO	International Organization of Standards
IT	Information Technology
Moreq2	The European Model Requirements for the Management of Electronic Records
RM	Records Management
RMS	Records Management System

ABSTRACT

The study was carried out at Ministry of Health Central Registry. The aim of the study was to enhance the automated record system of Ministry records, in order to prevent delay of Ministry records processing and management.

The researcher used a qualitative and quantitative research designs and this sought to describe the finding in details. The researcher collected data from 5 respondents. Several data collection methods where used and these include interviews, questioners and observation.

The efforts being made in the implementation of EMR in Health Facilities of Uganda is encouraging. Although there exist various challenges in the operationalization of the EMR systems, feedback from healthcare providers indicated an unstoppable will to move on with EMRs. The challenges and opportunities are summarized below. In the area of EMR implementation practices, the study noted challenges concerning the planning of activities from pre-implementation, implementation and post-implementation stages. In the planning stage, the key challenges included lack of master plan for EMR, overreliance on limited government funding and low exploration of alternative funding methods for EMR sustainability, low awareness on the existing National EMR standards, lack of information policy at the facility level, and a disconnect between initial planning by strategic managers and actual activation of the activities. Such a disconnect indicates a gap in user involvement and is likely to negatively impact on the process.

These challenges are likely to affect evaluation and monitoring of the EMR implementation process. Despite confirmation by strategic managers that users were being involved, the actual responses from EMR users indicated user involvement gaps in the EMR preparatory stages, choice of technology for medical data capture and analysis, EMR sensitization, testing and piloting. Such gaps are likely to affect EMR ownership and acceptability levels. As earlier stated, successful EMR should allow access to the patient record 24 hours a day, prevent medication error by providing decision support, support ongoing education for healthcare professionals, timely and effective care, improved hospital revenue, reduced patient-turn-around time, and sharing of information by authorized people.

This potential has not been realized in Uganda public Health Facilities. Some of the challenges contributing to 43 this include concurrent operation of manual, hybrid and electronic medical records system meaning that one has to rely on all for patient care and follow-up. Feedback from the respondents indicated no improvement in doctor patient time, nurse patient time, and patientturn- around time. Feedback from doctors and nurses indicated EMRs inability to provide information for use during their day to day operations. Lack of such information indicates a gap in the maximization of EMR systems information management opportunities in the Health Facilities.

The general usability of EMR for querying, availability of system help, and it speed received low ratings from the users. However, user interface screens, and retrieval of information were acceptable by a significant number of users. Although the strategic managers had confirmed installation of clinician's modules, the EMRs coverage of doctor's processes, such as monitoring of vital signs, prescription, drug administration was rated low. A similar case was noted with nursing where EMR coverage of nursing processes was also rated low. Feedback from health records and information officers indicated that the EMRs do not cover records management functions such as authentic creation of medical records, electronic signatures, retention and disposal of medical records. These gaps indicate a challenge in the identification of EMR requirements in the respective hospital functional areas. 5.3 Conclusions Public Health Facilities in Uganda face many challenges that are unique to the healthcare providers working there. The importance of the existing electronic medical record systems has at least been recognized despite the challenges being encountered.

The conclusion drawn according to the research findings of the study most of the respondents agreed that hhealth ffacilities may need to build on the existing EMR modules which have already been shown

to work, then add only relevant modules to the system depending on their priorities. The Facilities should identify the most appropriate technology for their EMR due to funding challenges or where possible explore other sources of EMR funding.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Records play an important role in documenting organizational activities. From financial records to contracts and correspondence, records are typically information that must be retained for a period to satisfy legal, financial, regulatory or organizational policy requirements (Haire, 2021). For any institution to recognize the value of records, records must be properly stored, protected and managed well so that they can be made available, retrievable and shareable (Schmid, 2021). Creation, storage and retrieval of active records is one of the concepts in records management and it has been taken into consideration as far as records and information management is concerned.

The term records management refers to a group of events or activities that are designed for the creation, controlling, maintaining, use, and eventual disposal of records (LeRon, 2021). Automation is a tool that can be used to facilitate records management and archival functions. It is the use of machines or systems to perform tasks normally performed or controlled by people (Ssekitto, 2019).

Globally, automation was in great demand during 2017 and it continued to grow in 2018 as more businesses realized the benefits of leveraging emerging technologies to reduce human labour (Britton, 2020). Automating administrative tasks allows employees to get on with tasks where they can really add value. It saves time across businesses, ensuring that information is compliant and can be accessed easily and securely. Automation has gained widespread usage in recent years in various processes of both public and private organizations in Uganda (Ssekitto, 2019).

Ministry of Health is a government body which was established in 1961 from the department of medical and social services during the colonial administration to enhance the leadership of the health sector. The ministry was first located at Entebbe and charged with running and supervision of all hospitals in Uganda majorly Regional Hospitals and this ministry had the most outstanding networks of medical services in the country from the early 1960's-1970's. Later it was relocated to Nakasero in Kampala along Lourdel road.

The MOH is made up of 6 departments headed by commissioners. They include; Finance and Administration, Planning, Quality Assurance, Nursing, Community Health, Clinical Services, National Disease Control and Human Resource Department.

In fulfilling its mandate, MOH creates, receives, and maintains different categories of records in its various departments. Such records need to be maintained for accountability, corporate memory, support the needs of the institution, decision making and service provision. This is crucial to the Record Management system and is done by automated classification and scheduling of records based on a pre-existing plan and standardized structures; Auto-Numbering, Type-based Metadata, Lifecycle Management, configuration of the system with pre-defined reports to search and screen records — allowing for the easy identification and resolution of exceptions; and a simple to use search across full-text content, file plan structures, records management categories and record types (Globodox, 2019).

Owing to the requirements of effective and efficient service delivery by the Uganda government through the Ministry of Health, active records management ought to be conducted with great effectiveness, efficiency, as well as ensuring secure storage systems that provide quick and rapid retrieval. However, there has been evidence that the MOH in Uganda has treated the function of active and general records management as a haphazard function. The current system of record keeping at the ministry of health central registry is still manual-based, traditional file-based records management techniques are used instead of a centralized database management system that ensures data security, integrity, and also provides faster data processing capability. This makes the vital information vulnerable to loss or mixing of records, and sometimes leakages.

In that regard therefore, an automated records management system will help the Ministry of Health Central Registry to enforce a centralized policy management for retention schedules, file plans, legal preservation holds, and auditing. This will also help ensure the ready availability of records in case of litigation and audits, as well as for future reference use.

1.2 Statement of the problem

Various aspects of records management at the Ministry of Health central registry are not up to date. There is lack of an efficient and reliable records management system to keep all stakeholders informed. There are poor active records management processes and storage schedules; inadequately trained personnel to handle creation of records, storage and dissemination; inadequate space, unclear chain of command among others. In other government institutions and agencies, automation of records management processes has been considered an indispensable tool for enhancing productivity, yet at the ministry of health little attention is paid to the automation of the records management processes and to understanding the forces of change that affect the form and integrity of the record. Therefore, this study will

aim to fill this gap by designing an Automated Records System for Active Records at the Ministry of Health Central Registry.

1.3 Purpose

To design and integrate an Automated Records System for Active Records at the Ministry of Health Central Registry with the existing EMR of all Health facilities in Uganda through assessing their efficiency and effectiveness.

1.4 Specific Objectives;

- I. To find out the different kinds of records created, stored and retrieved at the ministry of health central registry and Health Facility Centres.
- II. To study and investigate the current records management system used at the ministry of Health central registry and those at Health Facilities in order to obtain user requirements for the new automated records system.
- III. To organize the generated user requirements and design the automated records system for the ministry of Health central registry through assessing the opportunities and challenges of the different EMR at Health Facilities.
- IV. To implement the automated records system for active records at ministry of health central registry integrated with the EMR used in different Health Facilities.

1.5 Research Questions

The study will be guided by the following research questions;

1. What are the different kinds of records created, stored and retrieved at the ministry of health central registry and Health Facility Centres.
2. How are active records managed currently at the ministry of Health central registry and Health Facilities?
3. What are the challenges facing the current methods of active records management at the ministry of health central registry and Health Facilities?
4. What are the user requirements for the proposed automated records system at ministry of health central registry?

1.6 Scope of the study

Geographically the study will be carried out at Ministry of Health central registry which is located in Kampala on plot 7 Lourdel Road Wandegaya, Nakasero Hill Road and Eight selected Health Facilities which include Hospitals, Medical centres, Health Centre IV and clinics in the districts of Kampala, Wakiso and Mukono.

1.7 Significance of the study

The following will be the significance of the study;

The study will improve the way records are created, stored and retrieved at the Ministry of Health central registry.

The Study will also be used to improve information sharing, exchange and co-operation internally and externally when need arises.

Records managers or care takers will benefit from this research through gaining in-depth knowledge about automated records system, strategies and framework that ensures information is not lost but maintained for the required period.

The study will also provide relevant literature to other researchers who might want to conduct further research on designing automated records system for active records.

1.8 Description of operational terms

Active records: are records that are regularly used for the conduct of the current business of an organization or individual. (ISO, 2001) They are normally maintained in their place of origin or near the organization.

Automation: Automation can be defined as a technology concerned with performing a process by means of programmed commands combined with automatic feedback control to ensure proper execution of the instructions.

Records: A record is 'information in any format created, received, and maintained as evidence and information by MoH central registry in the transacting its business (IRMT, 2009).

Electronic Record: A record generated or received by MoH central registry in digital format that can be manipulated transmitted or processed by a computer.

Records Management: is the planning, controlling, directing, organizing, training, promoting, and other managerial activities involved in records creation, maintenance and use, and disposition in order to achieve adequate and proper documentation of the policies and transactions of the MoH central registry and effective and economical management of its operations.

Electronic Document Management System: It's a system designed to organize business files and records digitally, whether they started out in paper form or were generated by software applications.

Records Retrieval is the process of locating and removing a record or file from a storage. It is the action of recovering information on a given subject from stored record (Read and Ginn,

2010). It is the process of locating and withdrawing a document from a collection of records for referencing or updating purposes.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review involves the systematic, location and analysis of documents containing information related to the research problem being investigated. It aims at providing detailed knowledge of the topic being studied. It helps the researcher uncover what has been done by other researchers related to the problem being studied. It helps a researcher avoid unnecessary and unintentional duplication; it also forms the framework within which the research findings are to be interpreted. This chapter covered reviews of literature that relate to designing an automated records system for active records. The reviewed literature specifically covers the types of active records, the advantages of the different records for active records and the challenges facing the management of active records.

2.2 Types of Health Records

There are various types of health records as discussed hereafter;

Medical history record: A medical history record summarizes a patient's medical history and also includes some notes and remarks made by healthcare specialists. It can be used in a clinical environment, and the medical and healthcare translator should never misunderstand the contained information.

Discharge Summary: A hospital discharge summary is prepared when a patient checks out of the hospital. It normally explains the reasons for the hospital admission, the results of the tests made, and how the patient feels after the discharge – with some medical advices.

Medical test: It includes a blood test, a urine test, a heart test, and many other variants. Figures, chemical forms, molecules, quantities... everything have to be carefully looked by the medical and healthcare translator.

Mental Status Examination: It details the results of a mental exam. Is the patient in his/her right mental abilities. A medical specialist will present the results in an official document which may required a medical translator.

Operative Report: It is a report prepared to detail the procedures and findings of a surgical operation. The medical and healthcare translator should avoid any ambiguity and be as clear and concise as possible.

2.3 The Need For Automation Of Records Management

Organizations create, retain, and preserve records so that they can be used. If a user cannot locate a document, it might as well not exist. As such, an effective records management

program should have in place systems — manual or automated — that can locate and retrieve records in a reliable and timely fashion to meet the needs of users.

The need for a single repository resulting in high user adoption rate – Records management delivers excellent information classification, retention, and disposition management across the widest range of information sources, formats, and languages. User-friendly in nature and a simplistic interface makes it a must-have for employees and clients alike. It supports your best practices by meeting today’s business demands for control, flexibility, and accessibility.

Economical – An integrated records management system provides a secure and cost-effective alternative to uncontrolled expensive office space and self-storage options.

Confidential management and storage for hard copy paper documents demand resources. Electronic records management allows you to focus on your core business functions and ultimately operate more efficiently.

Meeting regulatory compliance obligations – Businesses can reduce the risk of non-compliance and avoid potential financial penalties, operational risks, and added costs

Increased productivity and efficiency – Organizations can leverage information to improve staff productivity, drive business efficiencies, and improve customer service

Legal preparedness – As information grows exponentially, secure access to the right information at the right time enables better use of information and responsiveness to legal discovery and audit.

Automating tasks like declarations, approvals, holds, retention and disposal to improve consistency and precision.

2.4 Abilities of the Automated Records Management System

Efficiency is key: Moving records offsite frees up space, boosts employee productivity, and helps any organization or business achieve greater cost savings.

Automated Records management systems commonly provide storage, versioning, metadata, security, as well as indexing and retrieval capabilities. Here is a summary of the description of the abilities of the Automated Records Management System.

Metadata is typically stored for each record. Metadata may, for example, include the date the record was stored and the identity of the user storing it. The RMS may also extract metadata from the document automatically or prompt the user to add metadata. Some systems also use optical character recognition on scanned images, or perform text extraction on electronic documents. The resulting extracted text can be used to assist users in locating records by identifying probable keywords or providing for full text search capability, or can be used on its own (Skipper, 2015).

Integration: Many Records management systems attempt to provide records and document management functionality directly to other applications, so that users may retrieve active records directly from the Records management system repository, make changes, and save the changed record back to the repository as a new version, all without leaving the application. Such integration is commonly available for a variety of software tools such as workflow management and content management systems, typically through an application programming interface (API) using open standards such as LDAP, WebDAV, and SOAP or RESTful web services (Hivakumar, 2016).

Indexing: Indexing tracks electronic records and documents. Indexing may be as simple as keeping track of unique record identifiers; but often it takes a more complex form, providing classification through the documents' metadata. Indexing exists mainly to support information query and retrieval (Meurant, 2018).

Storage: RMS has the ability to store electronic documents. Storage of the records and or documents often includes management of those same records and documents; where they are stored, for how long, migration of the records from one storage media to another (hierarchical storage management) and eventual records destruction.

Retrieval: Retrieve the electronic records from the storage. Although the notion of retrieving a particular document is simple, retrieval in the electronic context can be quite complex and powerful. Simple retrieval of individual records can be supported by allowing the user to specify the unique record identifier, and having the system use the basic index (or a non-indexed query on its data store) to retrieve the records (Meurant, 2018).

Distribution: A record ready for distribution has to be in a format that cannot be easily altered. An original master copy of the record is usually never used for distribution; rather, an electronic link to the record itself is more common. If a record is to be distributed electronically in a regulatory environment, then additional criteria must be met, including assurances of traceability and versioning, even across other systems (Ash Conversions International, 2020).

Security: security of records and important documents is vital in many Records management applications. Compliance requirements for certain records can be quite complex depending on the type of records. Food and Drug Administration regulations, dictate how the records control process should be addressed (Skipper, 2015). Records management systems may have a rights management module that allows an administrator to give access to records based on type to only certain people or groups of people.

Collaboration: Collaboration should be inherent in a RMS. In its basic form, collaborative RMS should allow records to be retrieved and worked on by an authorized user. Access

should be blocked to other users while work is being performed on the record. Other advanced forms of collaboration act in real time, allowing multiple users to view and modify records at the same time. The resulting record is comprehensive, including all users' additions.

Searching: Searching finds records, documents and folders using template attributes or full text search. Records can be searched using various attributes and document content.

2.5 Challenges Of The Traditional Methods Of Records Management

Most traditional methods of records management do not natively provide objects suitable to become consistent records or to be archived properly. This especially refers to personalisation & individualisation of proprietary formats for multimedia objects, mashups and distributed resources (Akporhonor, 2020).

New perceptions on how to generate and use information is one of the challenges of using the traditional methods of records management. The value of information is often disregarded or cannot be defined when information is originally created. Developments like social communities, rights management and data protection issues are some of the new ways of records management communication and interaction, which are all hard to implement using the traditional methods in as far as records management is concerned (Schmid, 2022).

The information growth challenge. There is exponential growth of information and no sufficient "management" of it. With traditional records management systems, there is uncontrolled redundancy, and yet the identification of the value of information, the growing dependency on the availability and accuracy of information has become more crucial than ever before (Nyampong, 2015). Records management is essential to fight the uncontrolled growth of information.

Misfiling of records. Misfiling is one of the common challenges in the file management and classification systems and misfiling of a record may lead to permanent loss. Ssenabulya (2013), refers to misfiling as the act of unintentionally placing documents on wrong files due to a poor filing system. This is however, time consuming and costly because it damages the entire system of managing records.

Duplication of files and file titles. Read and Ginn (2015) say that if all file users have authority to add subject titles to a classification system, then similar content becomes stored under two or more synonymous terms. Such storage of related records in different places separates records that should be stored together however it makes retrieval of all related records difficult.

Delays in file retrieval. With the traditional file based records management, retrieval delays start to occur with increase in volume of records. it can be time consuming to retrieve records

because a greater volume of files from cabinets will have to be accessed because of their complexity.

Inefficiency in the records management system. Ssenabulya (2013) notes that the importance of records management is to find the exact information that you're looking for. He adds that that is very difficult to understand how many items are kept in a store without classifying them in their specific grouping. If one does not classify them, it is impossible to manage the whole system.

Misplacement of documents. With the traditional file-based records management, some documents get lost and others are often misfiled, which means that out of 100 documents, 10 documents may sit on the wrong desk in the process of dispatching them from office to office. However, some documents cannot be reproduced if lost thus dramatically increasing the cost and putting active records at risks based on active filing systems.

High costs. Manual filing of records is costly in terms of requirements to operate it especially stationary and its time consuming to file documents and costly it also ensures misfiling. However also buying modernized filing cabinets is also quite expensive.

2.6 Comparison Between Automatic Records Management System And The Traditional Records Management Systems

Traditionally, there was only one type of record available, which was the physical record. The term physical record refers to a physical file that holds personal and confidential paper information. Although they were once the only type of records available, they are still in use today by many, if not most, offices including doctors and dentists. However, they have been joined today by the use of electronic records.

Electronic records can be described as personal and confidential information of an individual that is housed by electronic means, such as on a computer or a laptop.

A physical file is identifiable because it is a physical, tangible file that holds personal information for an individual. Unlike a physical record, electronic records are held on a server in a computer. For that reason, the electronic records are unable to be physically touched or held. For these records to be reviewed, they must be accessed through a computer.

When maintaining physical and electronic records, it is of the utmost importance that they are stored in a manner which keeps them safe and confidential. With physical records, many industries, such as education, require the records to be stored in a fire-proof file cabinet. By doing this, educational institutions and agencies can be assured that the physical records are protected at all costs. When retrieving physical records, it's important that any records maintained inside of a file cabinet are accessed by a key, which should be used to lock the

cabinet when employees leave the office (National Archives and Records Administration, 2015).

In contrast, electronic records must be protected by firewalls on the computer. A firewall can be defined as a program used in computers that works to protect information from being compromised without the proper permission. Firewalls are important to storing electronic records because, without them, the personal information of patients, students, or clients may be unlawfully obtained. When retrieving electronic records, users should first make sure that they are an authorized party that is allowed to retrieve the records.

2.7 Designing an Automated Records System for Active Records

Immediately when the structure of the team together with the timetable for the project are established, fundamental requirements for the project, including the project size and cost, has to be fully established. The other fundamental aspects to consider when designing an automated records system for active records are vendor and software functionalities, training, standards, analysis of business processes and integration with other legacy systems. And this includes working with internal stakeholders and understanding your legal requirements. Therefore, designing an automated records system for active records will enhance the provision of reliable and timely records for registry management.

2.8 Research Gap

Having clearly studied the above literature by different scholars on different aspects of the existing records and the different types of records for active records and records storage and retrieval management, advantages of the different records for active records and the challenges facing the management of active records, it is the choice of the researcher to depend on her aims in this case ensuring good records management since a lot has been written on records storage and retrieval but there is still a large hole and diversity in designing an automated records system for active records. Therefore, it was of very important that the study emphasized on the theoretical and practical approaches of designing an automated records system for active records.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents and explains the methodology of data collection that will be employed by the researcher, the data collection method that will be used, the collection instruments that will be used in the field analysis and the presentation and the ethical considerations. The chapter also includes the area of study, research design, the population size, sample size and the limitations encountered in the process of the study.

3.2 Research design

Basing on the objectives and research questions, the design and structure of the study will be qualitative in nature. A qualitative research design will be used because the approach will involve a very careful and complete observation of the person, situation and an institution over a period of time and will allow the researcher to probe a case study deeply and assess the records storage and retrieval at the ministry of health central registry.

3.3 Area of study

The study will be conducted at Ministry of Health Central Registry which is located on Plot 12; Nakasero Hill road, Kampala Uganda under human resource department and Eight selected Health Facilities which include Hospitals, Medical centers, Health Centre IV and clinics in the districts of Kampala, Wakiso and Mukono.

3.4 Target Population

This study will target all those employees involved in management at the Ministry of Health central registry for example records officer, Senior Records officer, Human Resource officer, Assistant records officers, IT administrators, data administrators, Strategic Managers and officers who use active records to perform their daily tasks. For the Health facilities, the study will target Doctors, Nurses, HRIOs, Managers/Administrators and other stake holders. Out of a Total population size of about 300 people, a sample of key 100 respondents will be chosen to take part in the study.

3.5 Sampling

A sample is the deliberate selection of a part of a population for purpose of studying the properties of the parent population (Mbaaga, 2012). Samples will be selected from the registry staff who are directly involved in the management of the registry records, and key users of the records. Purposive sampling technique will be used to ensure that the researcher selects 45 respondents.

3.6 Data Collection Method

The researcher will use interviews, observations, questionnaire, and document review Key informant interviews: Key informant interviews will be used on the registry staff where the researcher interacts with the staff members and requests for information to be used in the report.

Questionnaires: These refer to series of questions designed to elicit specific information from people. These will be used to gather data from a big group of people especially employees who use active records to perform their work on a daily basis. This will enable the researcher to come up with a set of requirements for the proposed system.

Observations: This involved viewing the objects with the naked eye. This technique will involve looking at various items including the records premises, the conditions of the space facility, Records storage equipment in place and the professionalism facilitated. It will be conducted using an observation guide.

Document review: This involves reading different works related to your area of study and also reading manuals and other organizational documents to get more information about an organization. Using this technique, we shall review manuals of various RMS that have been implemented elsewhere, in order to gain proper understanding of the problem we are trying to solve.

3.7 Data collection instruments

Data collection tools like interview guide, observation guide and questionnaires will be used to collect data for this study.

3.8 Data Quality Control

Data quality control is essential to ensure the integrity and validity of results. To ensure quality control, a pre-test of the research tools will be done before proceeding to the field to eliminate vagueness, grammar and ambiguity. The information / data collected will be recorded in a notebook to capture every kind of information during the process.

3.9 Ethical considerations

Efforts will be made to ensure that the consent of the respondents are sought before going ahead with any interview. A respondent who turns down the interview will not be interviewed. In addition, a letter of introduction will be obtained from the Dean's office and presented to the authorities at the ministry of health central registry. Any Research Assistants will also be introduced to the administrators. The purpose of the study will be explained to the prospective respondents before an interview.

3.10 System Analysis

This will be done soon after the data collection phase has been completed and this involves discussing the findings from data collection with other team members. Using data analysis tools like data analytical software like Microsoft Excel, collected data will be analysed to get a stable set of requirements in form of a requirements specification. The requirements specification document will contain functional and non-functional requirements that will be used to guide the design phase for the automated Records Management system. Also during the systems analysis phase, proper documentation will be done which will help in review processes during system development.

3.11 System Design

After successful establishment of requirements for the proposed system, the automated records management system will be designed basing on the requirements established from the collected data. The application shall run on all devices running any version of windows operating systems or Linux according to our IT research assistants. System design will be carried out with the aid of data-flow diagrams, Entity-Relationship Diagrams. Data-flow diagrams will be used to show the different processes involved when interacting with the system, how information flows within the system and show inputs and outputs of the system. Entity-Relationship Diagrams will be used to show relationships between the various entities that make up the system. These will mostly be used to design the conceptual model of the automated records management system. These will give a description of the system's behavior as it responds to a request that originates from outside of the system.

3.12 System Implementation

With the help of IT technical personnel like system developers and system analysts from the school of computing and informatics technology of Makerere University, System implementation will be done using programming language like Java, JavaScript, CSS and other development environments. Implementation of the front end or client side will be carried out using java programming language and CSS. SDK will be used to come up with the different functionalities of the application and also designing the interface at the client side.

Implementation of the back end or server side of the system will be done using database languages like MySQL and server-side scripting languages like PHP will be used. MySQL Will be used to come up with the database structure and PHP will be used to write scripts that will process data at the server side.

A debugger integrated in Eclipse or a standalone debugging monitor will be used. An integrated development environment like Eclipse or Android Studio will be used during implementation of the system.

3.13 System Testing and Validation

After successful implementation, the system will be tested using devices in order to identify errors. The developers will run the system to see if the results conform to the user expectation and technical specifications. The automated RMS will then be presented to the intended users who will then interact with it to test whether it supports the way they carry out their tasks.

3.14 Limitations of The Study

The following are some limitations that the researcher may face while carrying out this research; there may be a problem of data inaccessibility as a result of some respondents being hesitant to reveal out sensitive but yet relevant information.

Inadequate technical skills in ICT and systems development will be a limitation to the accomplishment of this study. But the researchers will work hand in hand with system developers to mitigate this problem and achieve the project target.

CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

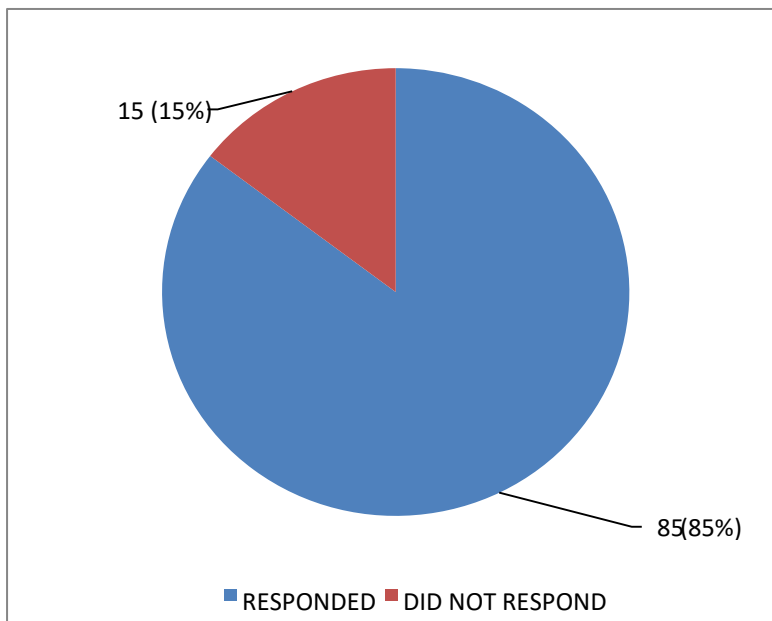
4.1 Introduction

This chapter presents the findings, interpretations and discussion in line with the objectives of the study. Analysis and interpretation of data is concentrated on EMR pre-implementation, implementation and post-implementation stages and zooms in into these stages by looking at the methodologies being applied, the impact of EMR, challenges being faced, existing opportunities, and the EMR ability to generate authentic medical records. Data is presented in form of charts and tables for ease of follow-up and understanding.

4.2 Response Rate

The response rate from each of the selected Health Facilities ranged between 68-100%. Out of the 8 selected Health Facilities, one had a response of 100%, two returned a response of above 92-99%, three were between 80-90% while two were between 68 -78%. The response for each staff category namely doctors, nurses, health information officers, and Administration/Management Personnel was above 80%. The overall response rate is shown in Figure 4.1 below.

Figure 4.1: Overall Response Rate



Source: Research data

While we should not expect full response in studies where responding is voluntary, scholars utilizing questionnaires should aim for a high response rate (Baruch & Holtom, 2008). Baruch and Holton (2008) in their research on response rate covering more than 100,000 published researches with over 400,000 individual respondents, found an average response rate of 52.7% (Rogelberg & Stanton, 2008) which means the response rate for this research is within acceptable limits.

4.3 Existing EMRs and hospitals Background Information

A total of 20 Administration/Management Personnel were purposefully selected to supply EMR background information on the selected health facilities. The information sought included facility classification, clinical service provided, number of staffs, facilities workload in terms of inpatient and outpatient, EMR modules installed, technologies being used for data capture and management, and EMR funding. Two (2) of the selected Health Facilities were Private Hospitals, Two (2) were Health Centre IV, Two (2) Medical Centres, One (1) Clinic, and One (1) National Referral Hospital. The services provided in most of the Health Facilities were accident and emergencies, paediatrics, consultants clinics, comprehensive care clinics for HIV patients, Gynae, medical and surgical. Only the two hospitals and referral hospital were providing Intensive Care, renal dialysis and Cancer treatment. The bed capacity in the selected Health Facilities approximately ranged from 20 to 1500. This information was considered essential for reliable data analysis and interpretation especially on impact of EMR to healthcare services in Public Health Facilities, and in the identification of the support being provided by the facility management. See table 4.1 for details

Table 4.1: Health facility level, size and general workload

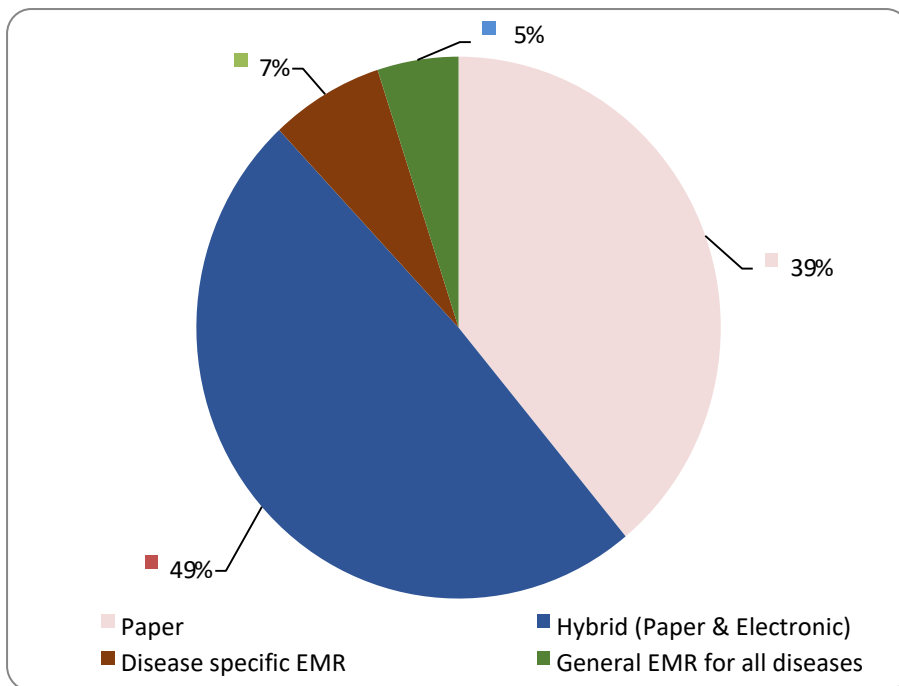
FACILITY NAME LEVEL	SAMPLE SPACE	NO. OF RESPONDENTS	NO. OF BEDS	OUTPATIENT PER DAY	ADMISSIONS PER DAY
Ministry of Health (Kampala)	20	18	-	-	-
Mulago Hospital (Kampala)	15	12	1500	2000	350
International Hospital of Kampala	15	13	1350	350	100

St. Francis Hospital Naggalama (Mukono)	15	15	450	300	100
Kisenyi Health Centre IV (Kampala)	5	4	150	250	50
Kira Health Centre IV (Wakiso)	5	3	255	270	30
Life Link Medical centre (Kyaliwajjala Wakiso)	10	8	50	120	10
AAR Medical Centre (Bweyogere-Wakiso)	10	8	20	50	5
Green Cottage Clinic (Mukono)	5	4	35	100	15
TOTAL	100	85			

Source: Research data

The medical records systems being used in all the selected Health Facilities, include hybrid (paper and electronic), paper only, disease specific, and general EMR. 49% of the respondents comprising of doctors, nurses and health information officers confirmed combined use of paper and electronic systems. A significant number of respondents (39%) confirmed usage of paper alone in some areas of the facilities. Low utilization of disease specific and general EMR was reported. Figure 4.2 provide more details.

Figure 4.2: Users Categorization of the Existing Medical Records Systems

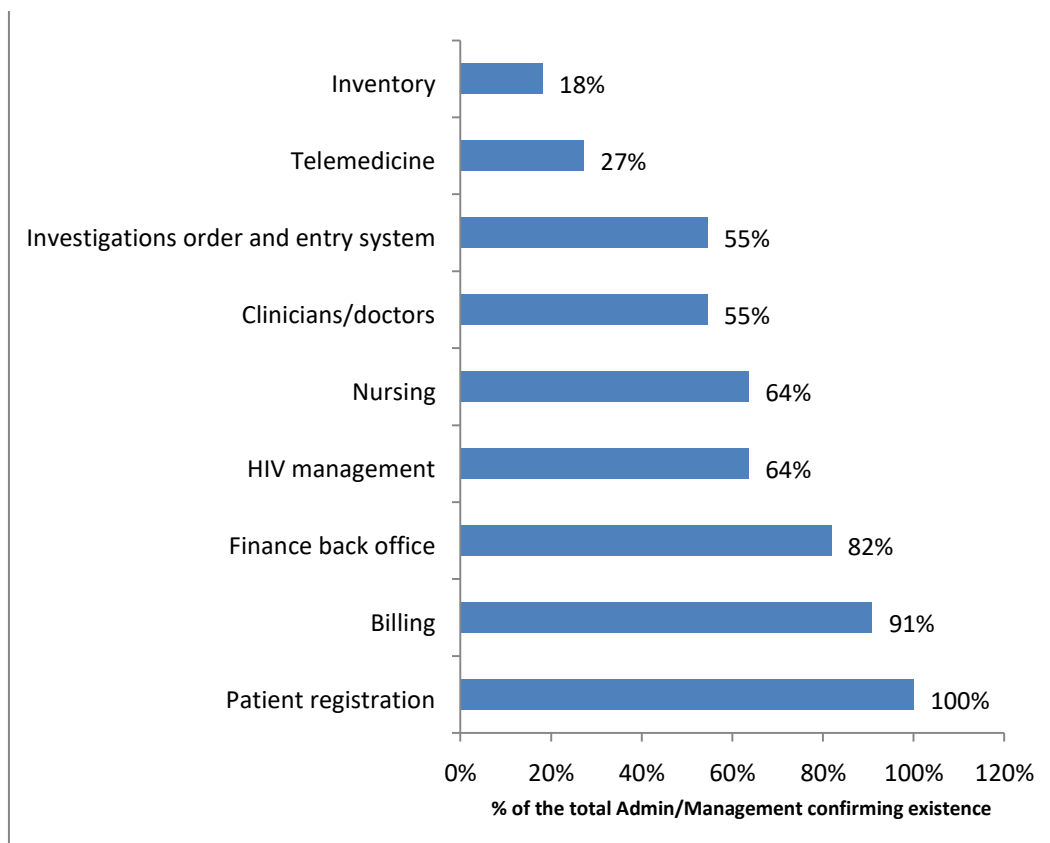


Source: Research data

4.3.1 Existing EMR Modules

Over 80% of the Administration/Management Personnel confirmed existence of patient registration, billing and finance back office modules while slightly over 60% confirmed existence of HIV management and nursing modules. About 50% confirmed existence of Doctors and investigations order and entry modules while only about 20% confirmed existence of telemedicine and inventory module (see figure 4.3). This is an indication that most of the facilities are focusing more on patient registration and bill capture while moderate attention has been given to immediate patient care needs and documentation of clinical data.

Figure 4.3: Existing EMR Modules

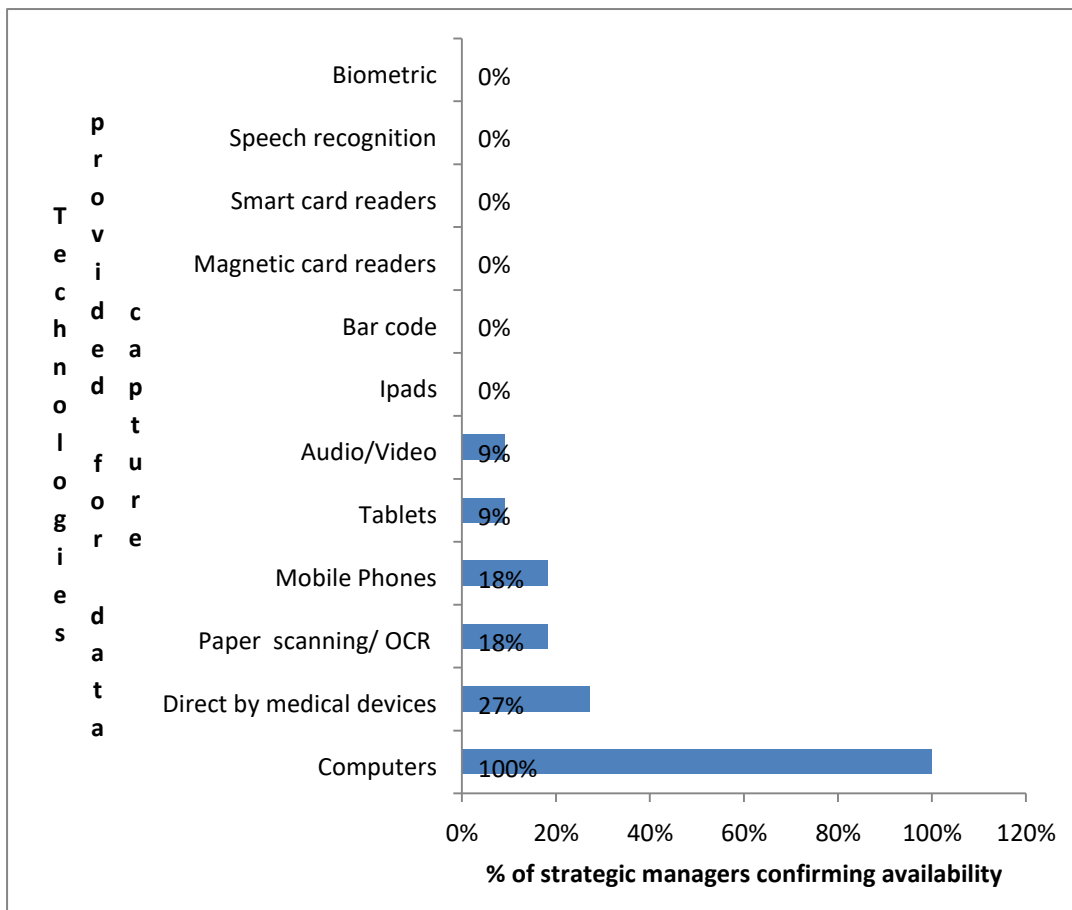


Source: Research data

4.3.2 Technologies and Equipment Provided for Information Management

Apart from computers, most of the modern digital technologies are rarely used in the hospitals. Low level of computer compatible medical devices was observed more in Health Centre IV as indicated by the (27%) of Managers who confirmed direct data capture by medical devices. Only 18% of the Managers confirmed use of paper scanning meaning that digitization of the existing paper medical records is yet to penetrate Public Health facilities. Technologies such as tablets, audio, video, iPad, bar code, magnetic readers, smart card readers and biometric have been lowly procured by the hospitals. This is likely to affect impact on ease of use of the existing EMR. The prevalence of the technologies is indicated in figure 4.4.

Figure 4.4: Technologies Provided for Information capture and management



Source: Research data

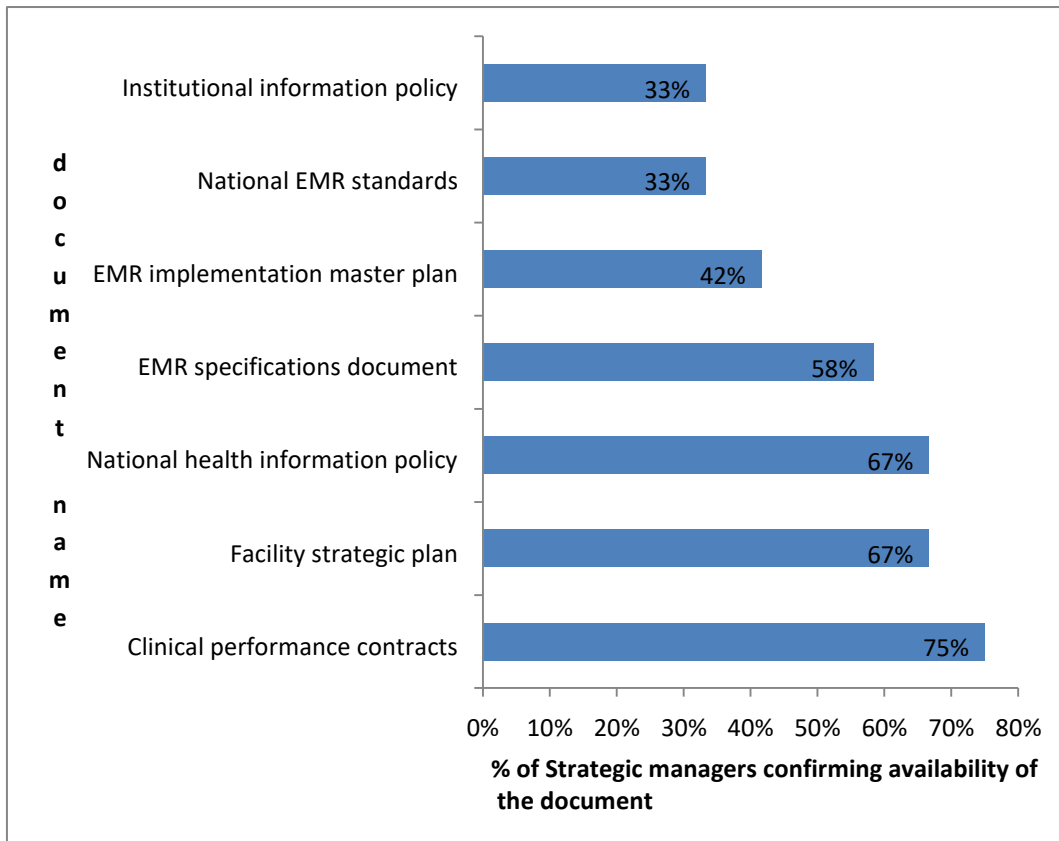
4.4 EMR implementation methodologies

In the area of implementation methodologies, the study focused on initial pre-implementation planning, availability of vital strategic document, funding, user involvement, and information management strategies. The findings are presented in the following sections.

4.4.1 EMR Pre-implementation Strategies and Planning.

The importance of an EMR strategy as put by Pollack (2010) is to ensure that technology activities are properly aligned with the evolving needs and strategies of the health facilities. To identify the strategic efforts being made by the facilities, this research sought to know whether there was existence of the tabulated strategic documents. Majority of the Administrators and Managers in the selected facilities confirmed the existence of vital strategic documents. Existence of the National EMR standards and Institutional information policy were rated low at 33% meaning that the impact of the standards in EMR implementation is yet to be realised. See Figure 4.5 below

Figure 4.5: Availability of vital strategic documents

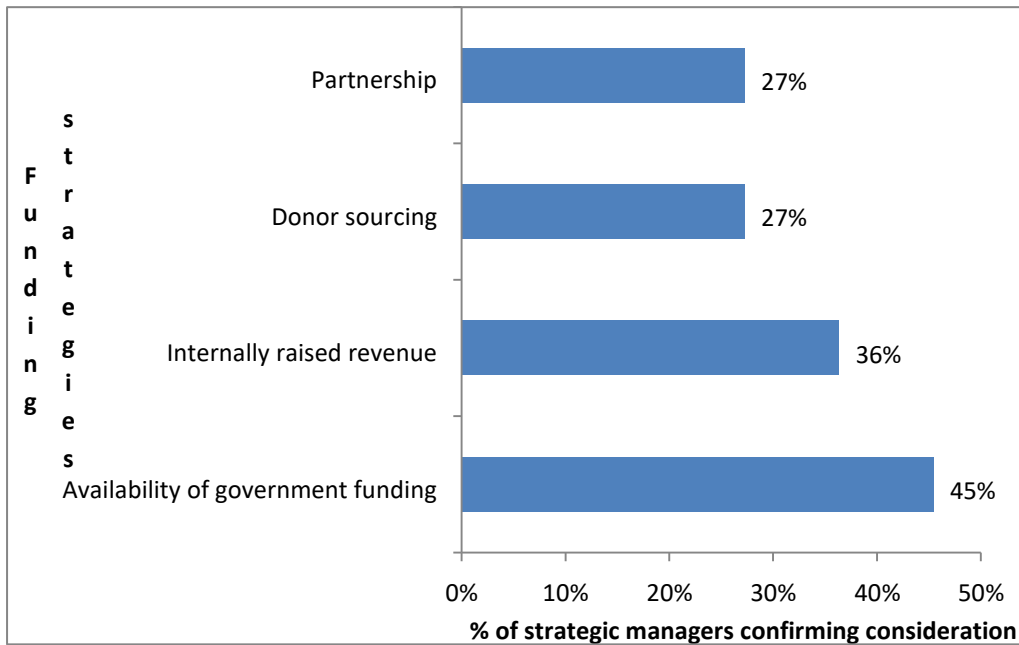


Source: Research data

4.4.2 EMR Funding Planning

According to the Ministry of Health, EMR implementation is an expensive affair. Heidenreich (2008), reports that funding continues to be a problem in most countries due to the significant cost of implementing EMR. He further advises that facilities should have a multidimensional strategy for EMR funding to ensure success. To probe funding strategies, this research focused on partnerships, donor sourcing, internal revenue and government funding. See Figure 4.6

Figure 4.6: Strategic Managers Response on EMR Funding Strategies



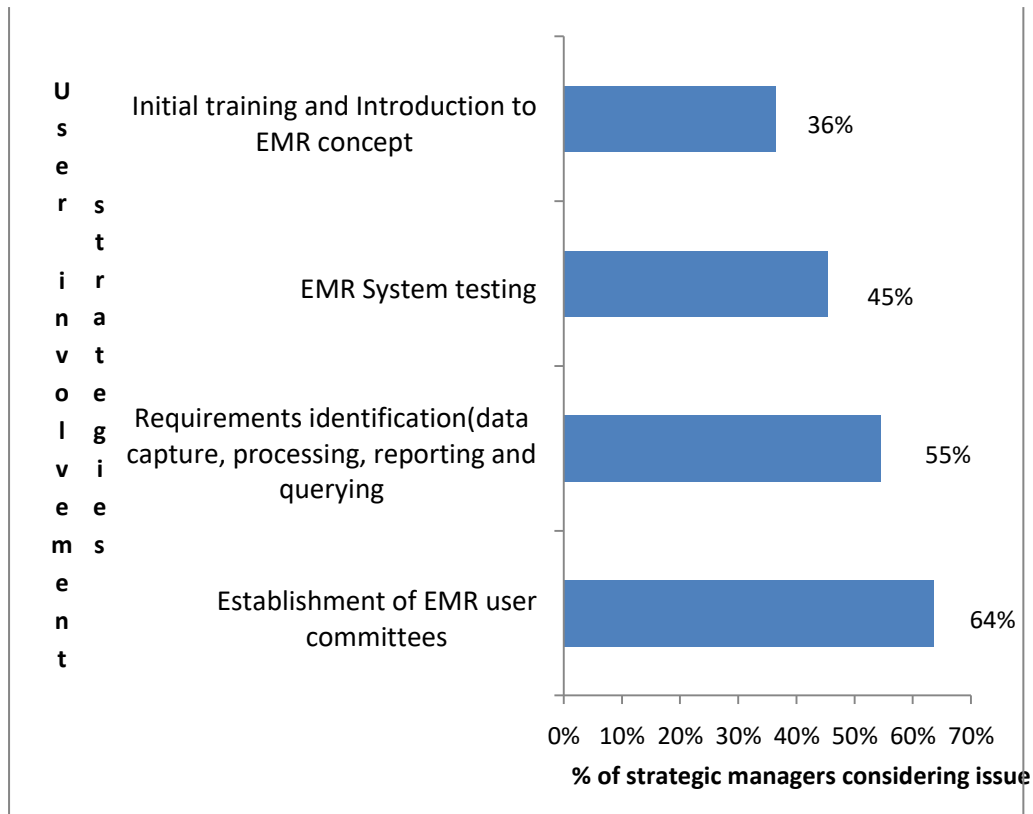
Source: Research data

Most of the strategic managers confirmed overreliance on government funds while less than 30% indicated lack of donor sourcing and partnership. Considering that funding remains one of the major constraint in healthcare, the trend seen in Health Facilities is likely to affect sustainability of the EMRs.

4.4.3 User involvement strategies

To gather data on whether strategic managers were considering user involvement strategies, the managers were asked to rate consideration of various involvement issues in a scale ranging from not considered, slightly considered to highly considered. The respondents who confirmed that they did not consider or slightly involved users were grouped together and termed as those who did not consider user involvement. The rest of the respondents are the ones who considered user involvement. Majority of the strategic managers (64%) confirmed establishment of user committees and user involvement in requirements identification. A small number of managers (36%) confirmed initial training of users and sensitization on EMR. This means that the majority of strategic managers (64%) are not considering training and sensitization of users on EMR and this is likely to impact on EMR acceptability and use. Only 45% confirmed consideration of EMR testing which means that the existing EMRs were not adequately tested. See figure 4.7 for more details on user involvement strategies.

Figure 4.7: Strategic Managers Responses on User Involvement strategies

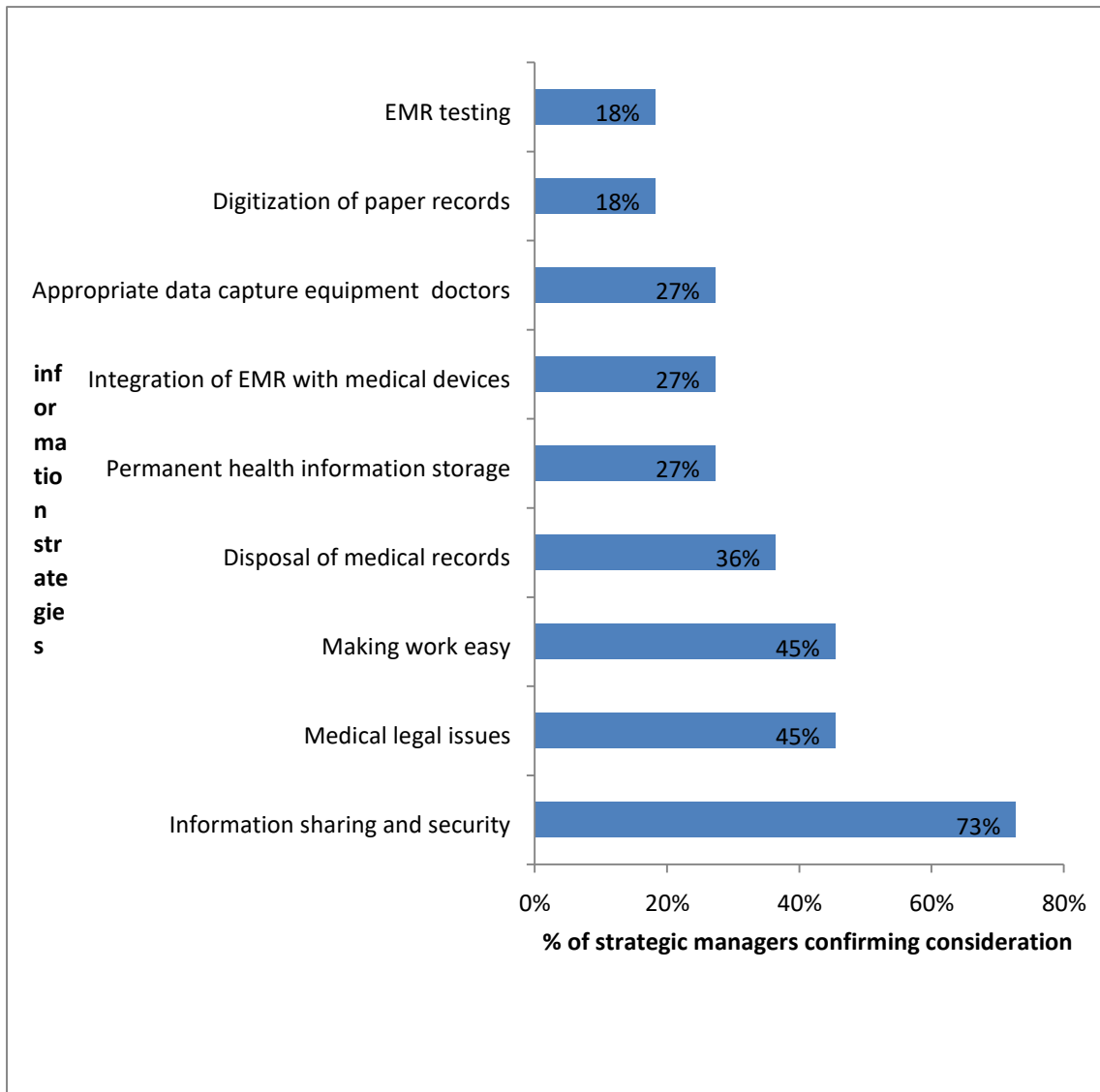


Source: Research data

4.4.4 Information Management Strategic Issues

Electronic Medical Record, as Luo (2006) affirms is more than an electronic version of the paper-based record because a computer-based system is required for managing and delivering data required for patient care. Such a system should provide an integrated view of patient data, clinical decision support, clinician order entry, integrated communications support, and access to knowledge resources. Besides information sharing and access, American Health Information Management Association (AHIMA), advises that a medical record must be authentic to be trusted as evidence. To achieve this purpose a good records keeping as envisioned in the ministry of health strategic plan is mandatory. To gather data on information management, strategic managers were asked whether they considered the information strategies listed below during EMR planning. Majority of the strategic managers (73%) indicated consideration of information sharing and security in their responses. A significant number considered legal issues while disposal of medical records, permanent retention, and integration of EMR with medical devices received the lowest consideration (See figure 4.8). The low consideration of medical records management function implies low consideration of the EMRs as records management systems.

Figure 4.8: Percentage of Strategic Managers Considering Information Strategies



Source: Research data

4.5 EMR Implementation

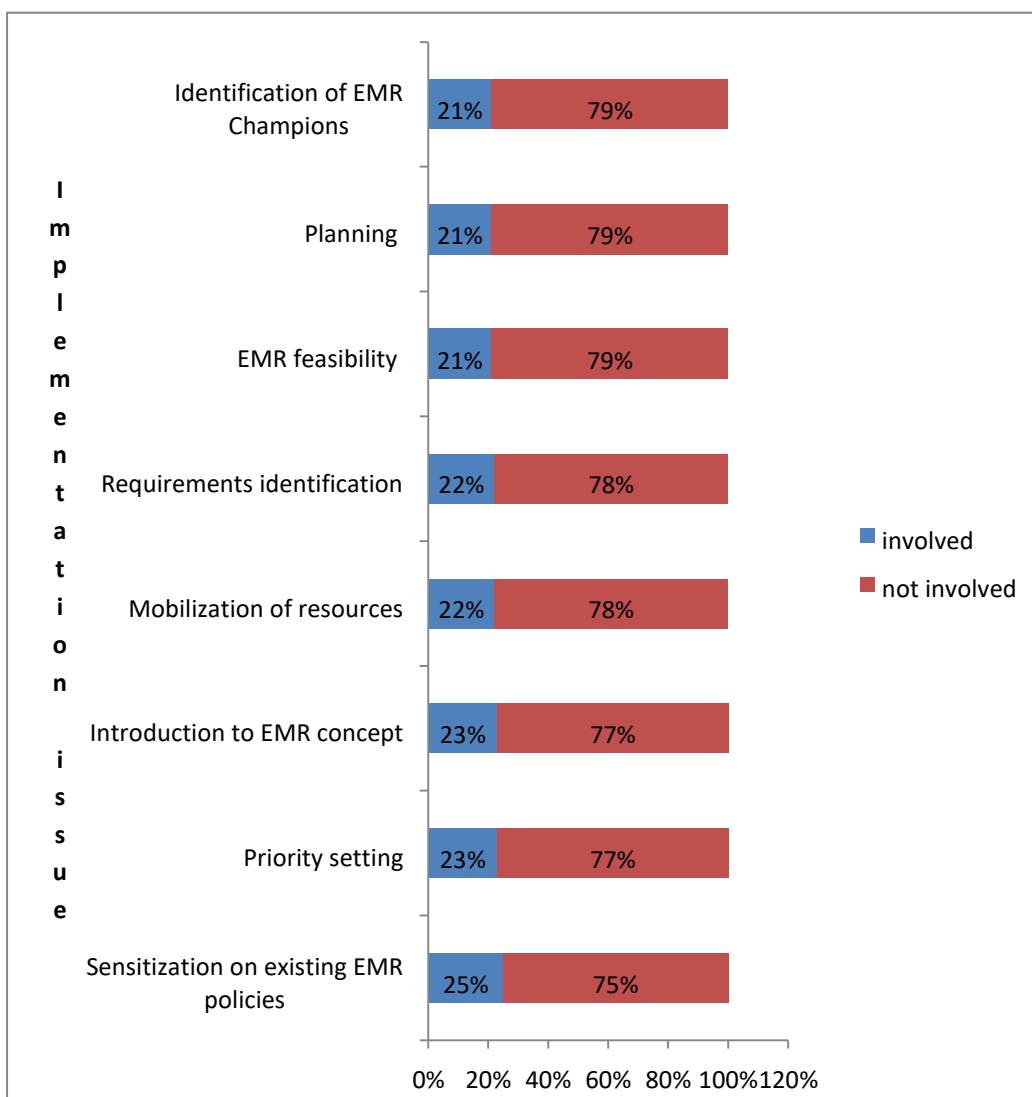
EMR implementation as Rogers (2003) puts it, is the stage at which the pre-planned activities are activated. Lorenzi et al (2009) opines that implementation experience depends on a variety of factors including the technology, training, leadership, the change management process, and the individual character of the healthcare practice environment. Successful implementation calls for intensive user involvement in all stages of implementation.

4.5.1 Actual User Involvement

To gauge the level of EMR user involvement in all the selected Health Facilities, Doctors, Nurses and Health Information Officers were asked to indicate the level at which they were

involved using a scale of involved, slightly involved, moderately involved and fully involved. The responses for not involved and slightly involved were combined together and treated as not involved while responses for moderately involved and fully involved were combined to mean involved. Over 75% of the 100 users who responded on this issue indicated no involvement in the implementation process. Only about 20% of the users confirmed involvement. The low involvement reported by the actual EMR users indicate that the user involvement strategies by hospital management are either not effective or not implemented adequately (See figure 4.9).

Figure 4.9: Actual user Involvement in EMR Planning and Resource Mobilization



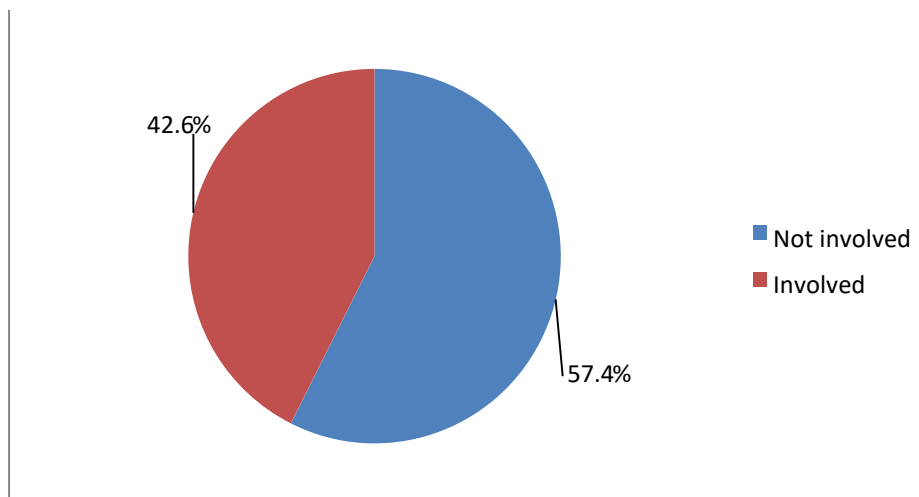
Source: Research data

Although strategic managers had confirmed having strategized for user involvement, from the EMR user perspective, involvement is largely lacking. Hoerbst (2010) advises that because EMR users demands for functionalities that would benefit them, they should be appropriately involved in EMR implementation and workflow change processes.

4.5.2 User involvement in selection of EMR technology

EMR technology covers treatment data capture, data processing, storage and retrieval, and dissemination. Such technology include automated data capture systems, software, networks and communication devices. On this issue, majority of the respondents (57.4%) indicated lack of involvement (See figure 4.10)

Figure 4.10: User Involvement in Choice of EMR Technology

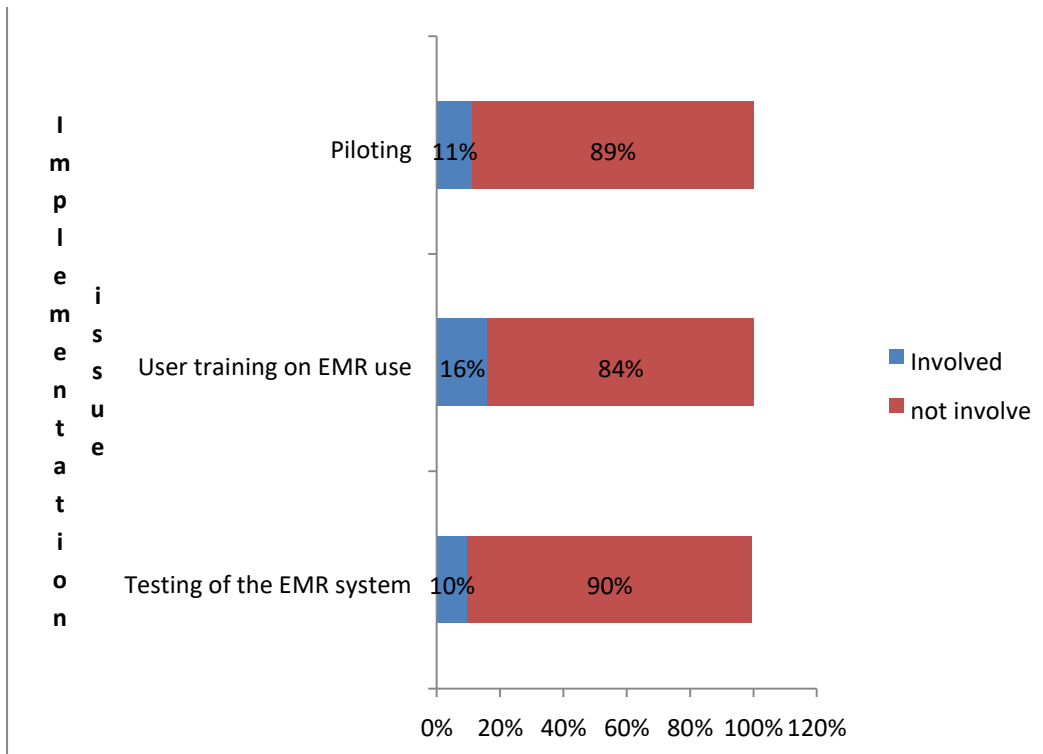


Source: Research data

4.5.3 User Involvement in EMR Testing, Piloting and Training

To gauge the level of involvement in this issue, the respondents were asked to indicate on a scale of not involved at all, slightly involved, moderately involved and fully involved. Responses for moderate and fully involved were interpreted as involved while the rest were combined to represent lack of involvement. Majority of the respondents indicated lack of involvement in piloting, user training on EMR use and testing while the percentage of those involved in the same issues ranged between 10-15% (See figure 4.11).

Figure 4.11: Users Involvement in Piloting, Training and Testing of EMR

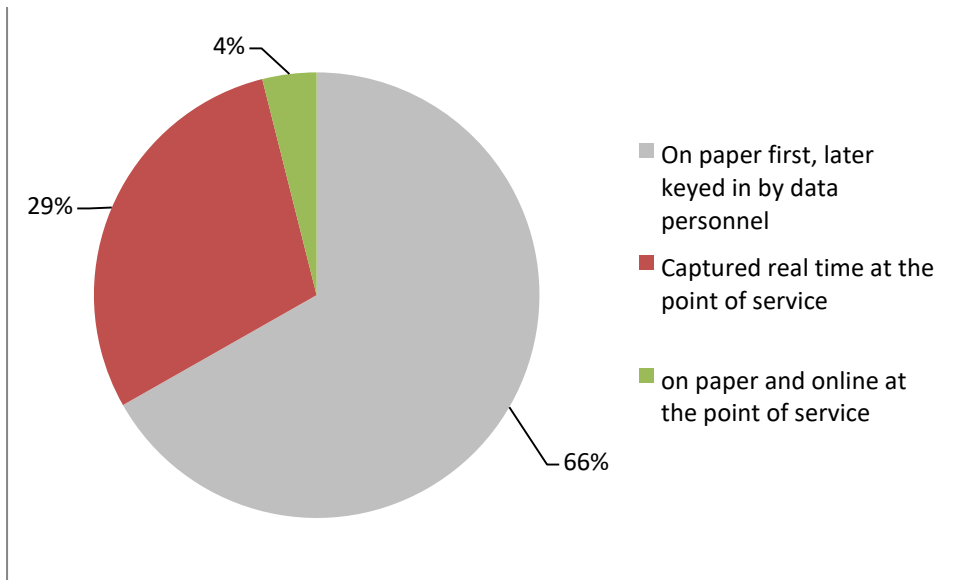


Source: Research data

4.5.4 Data Capture Methods Being Used

The data capture methods being used in the Health Centres include capture on paper first and later transfer to computer system, real time electronic capture at the point of service, and on paper and online at the point of service. Majority of the respondents (66%) confirmed capture on paper first and transfer to electronic. Very little point of service data capture was reported. Lack of point of service data, is likely to contribute to lack of timely follow-up information especially when a patient revisits the Health Facility before the previous episode is captured. Figure 4.12 provide details

Figure 4.12: Methods of EMR Data Capture

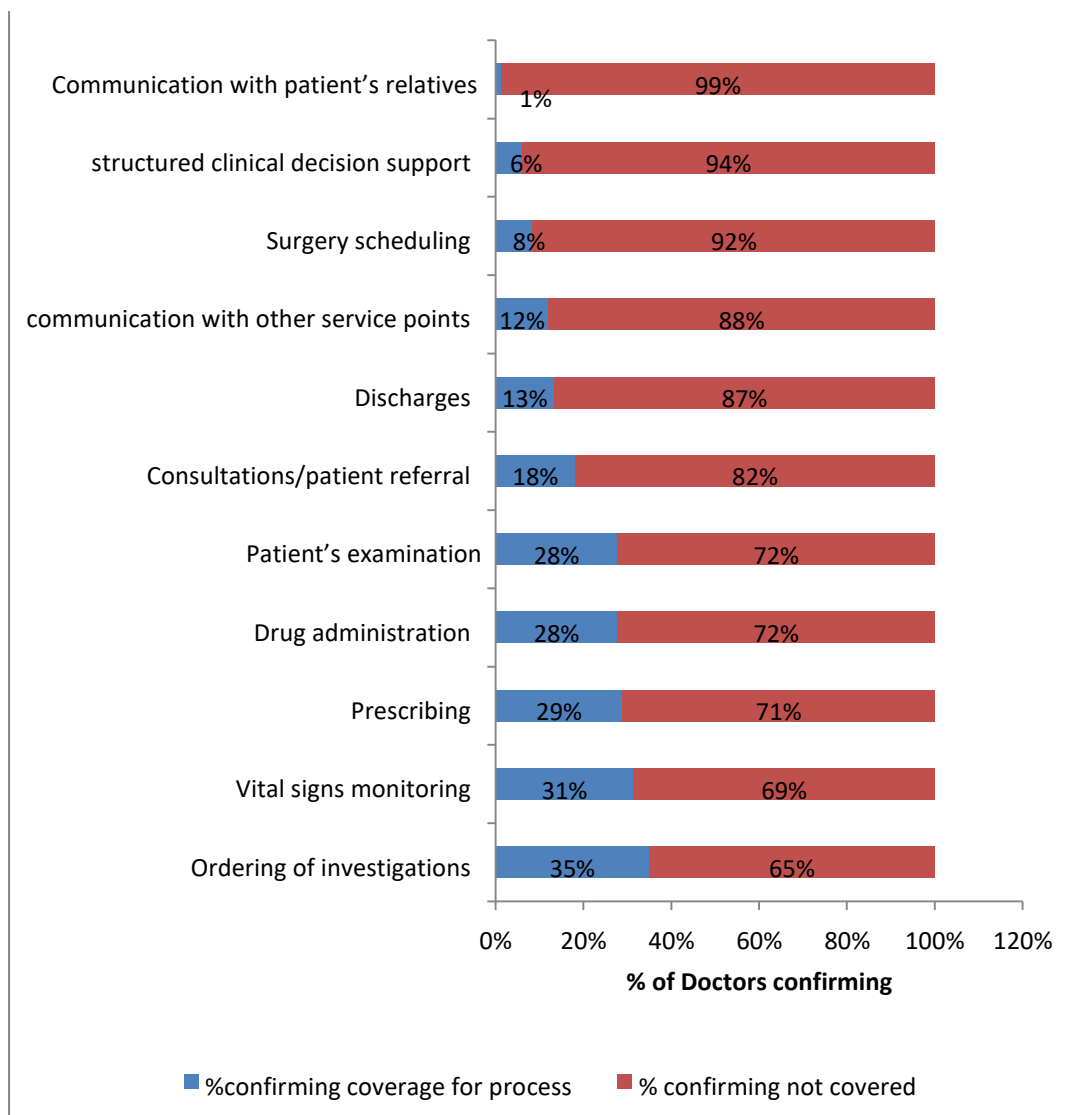


Source: Research data

4.5.5 EMR coverage of Doctors Processes and Documentation

To gauge the extent to which the implemented EMRs cover clinical processes performed by the doctors, doctors were asked to select automated clinical processes from a pre-prepared list. The list contained processes such as vital signs monitoring, patient examination, ordering of investigations, drug administration, and surgery scheduling among others. Over 70% indicated no coverage meaning that the uptake of EMR by medics is low (see figure 4.13). Keshavjee et al (2006) argues that for EMR to have a direct impact on immediate patient care needs, a minimum data set must be defined, system reminder methods for clinicians must be designed and agreed upon, and a good system infrastructure must be put in place. Such an approach is likely to impact positively on EMR uptake. The low uptake indicates a disconnect between installation of EMR modules earlier confirmed by strategic managers and actual usage by the targeted users.

Figure 4.13: EMR Coverage of Doctors' processes

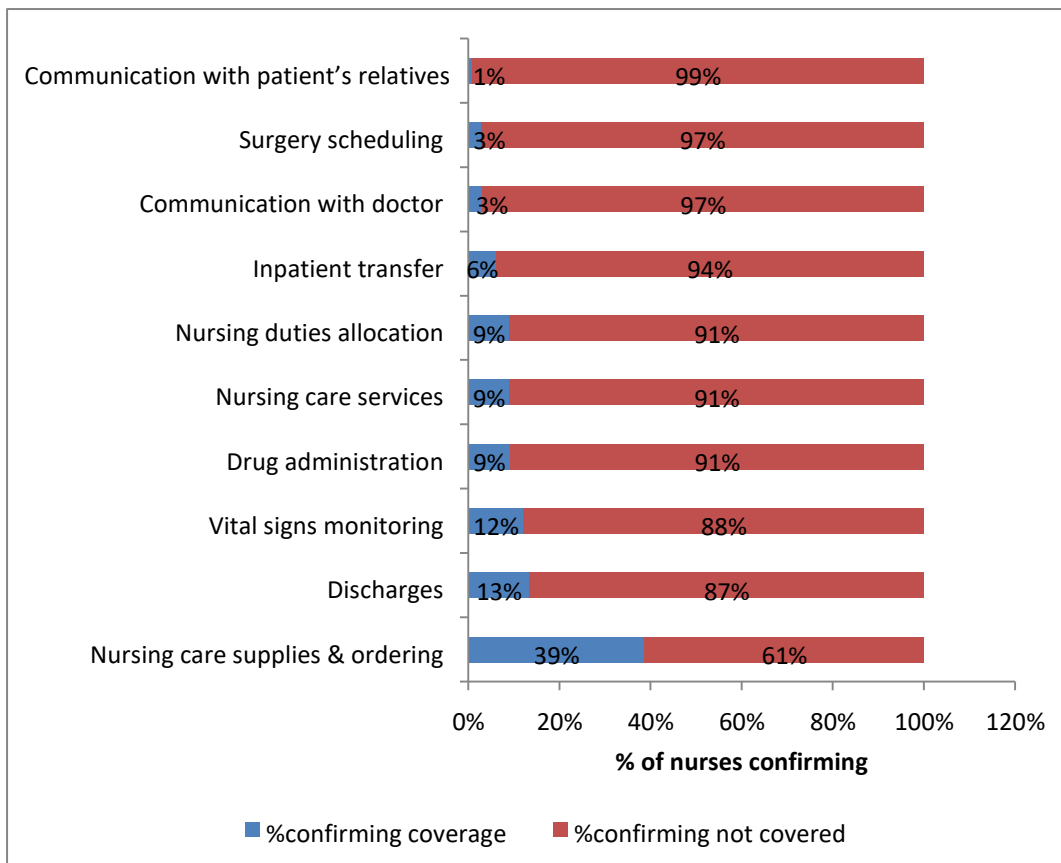


Source: Research data

4.5.6 EMR Coverage of Nurses Processes

To gauge the extent to which EMRs covered nursing processes, nurses were asked to select automated nursing processes from a pre-prepared list containing items such as vital signs, communication with doctor, inpatient transfer, nursing care services, and nursing duty allocation among others. Majority of the nurses catering for over 87% indicated no coverage meaning that EMR uptake is also low in nursing. A significant number of nurses indicated EMR ability to provide information on nursing supplies (See figure 4.14). The low coverage could be attributed to lack of user involvement reported earlier in this report

Figure 4.14: EMR coverage of nursing processes

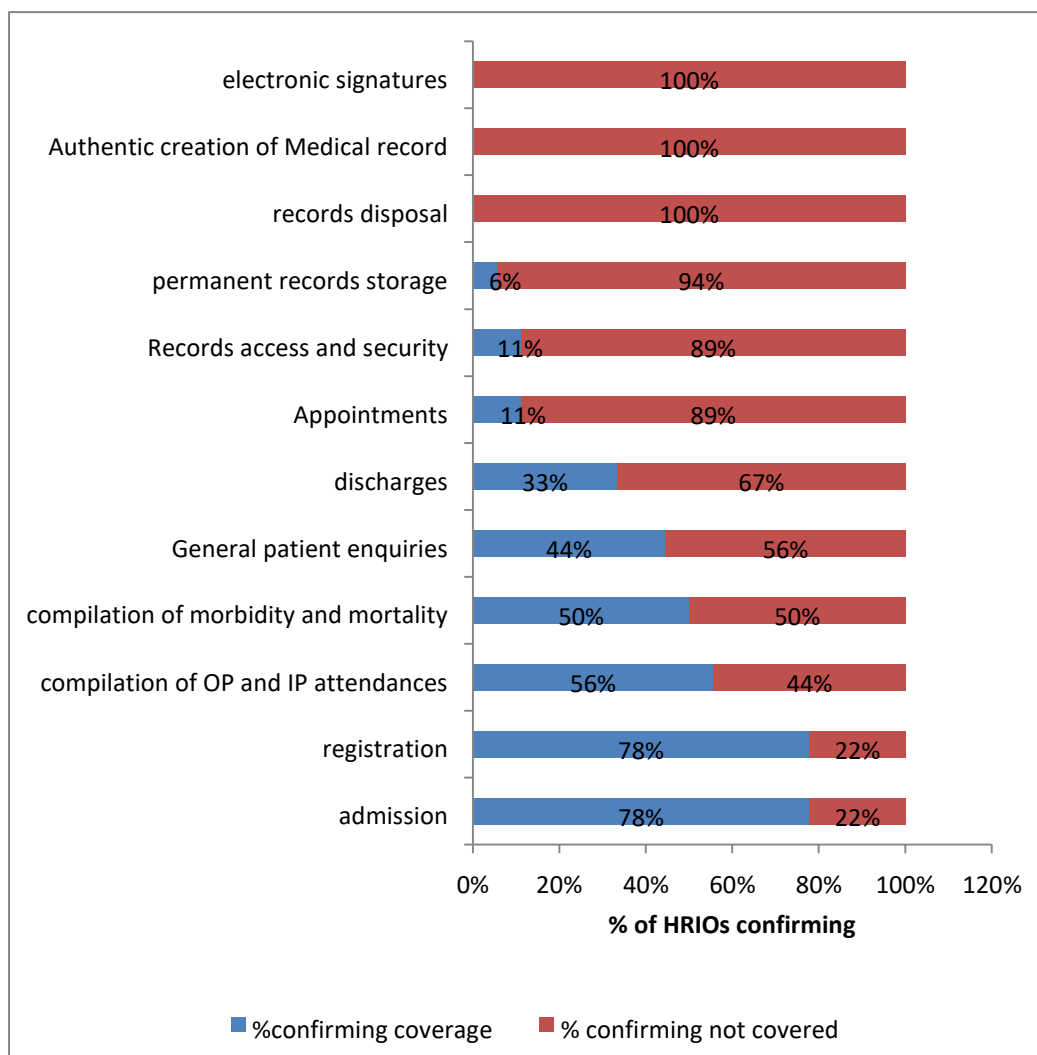


Source: Research data

4.5.7 EMR Coverage of health records and information management processes

According to Mann (2003), the importance of an EMR is seen in its ability to serve as the primary repository of all information regarding patient care, provide decision-support, and be a tool for supporting and maintaining ancillary health care activities such as administration, medical legal support, quality assurance, research and epidemiology. To assess the extent to which the installed EMR covers health information management processes, the selected Health Information Officers were asked to pick automated processes from a pre-prepared list of issues such as use of electronic signatures, authentic creation of medical records, records disposal, security, compilation of medical statistics, and appointment scheduling among others. About 50% confirmed coverage of patient registration and compilation of attendance statistics. Majority of the respondents ranging between 50-100% indicated no coverage of electronic signatures, authentic creation of medical records, permanent storage and disposal (See figure 4.15). Lack of coverage in this area implies that the existing EMR cannot provide reliable medical legal evidence.

Figure 4.15: EMR coverage of Health Records and Information Management Processes



Source: Researcher data

4.6 EMR Post Implementation Stage

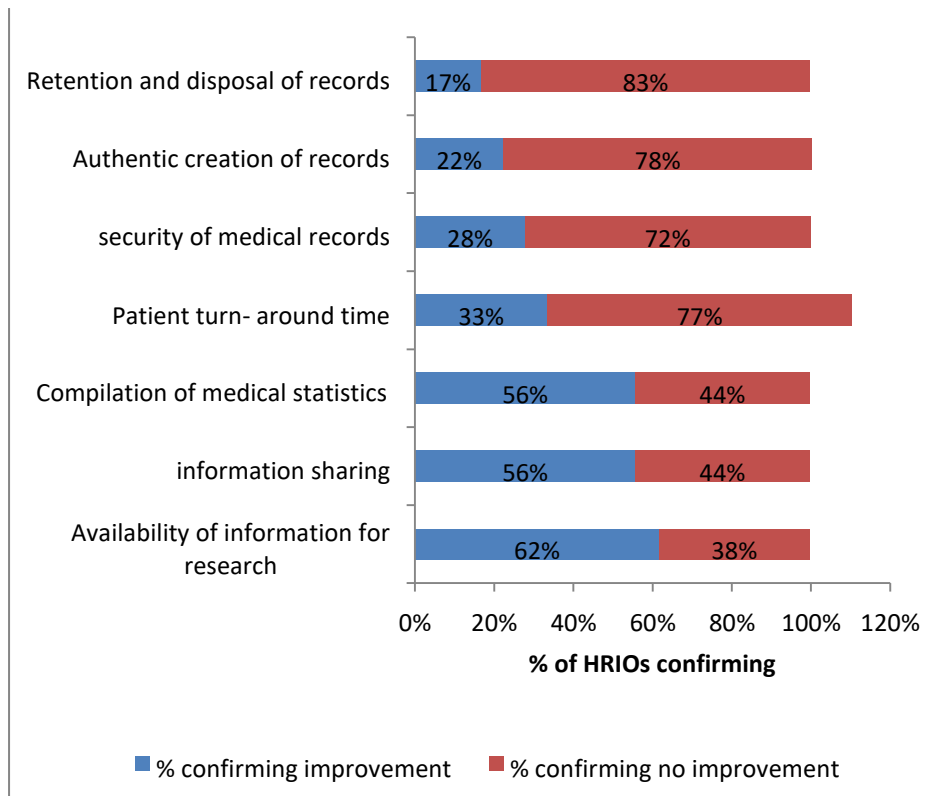
In post-implementation, the study focused on EMR impact on health information services, Doctors’ processes, and Nursing processes. The findings in this area are presented in the following sections.

4.6.1 EMR Impact on Health Information Services

To gauge the impact of EMR on health information services, Eighteen (18) Health Records Information Officers distributed in the selected Health Facilities were asked to confirm whether they have noted improvement in various areas of information management. Most of the HRIOs catering for 56% of this category reported improvement in information sharing,

compilation and reporting of medical statistics, and availability of information for research. Other areas of information management such as retention and disposal of medical records, authenticity of medical records, security and turn-around time for patients were rated below 28% meaning that EMR has not impacted well in the areas. The details on ratings are provided in figure 4.16 below.

Figure 4.16: HRIOs Ratings on EMR Performance on Health Information Management

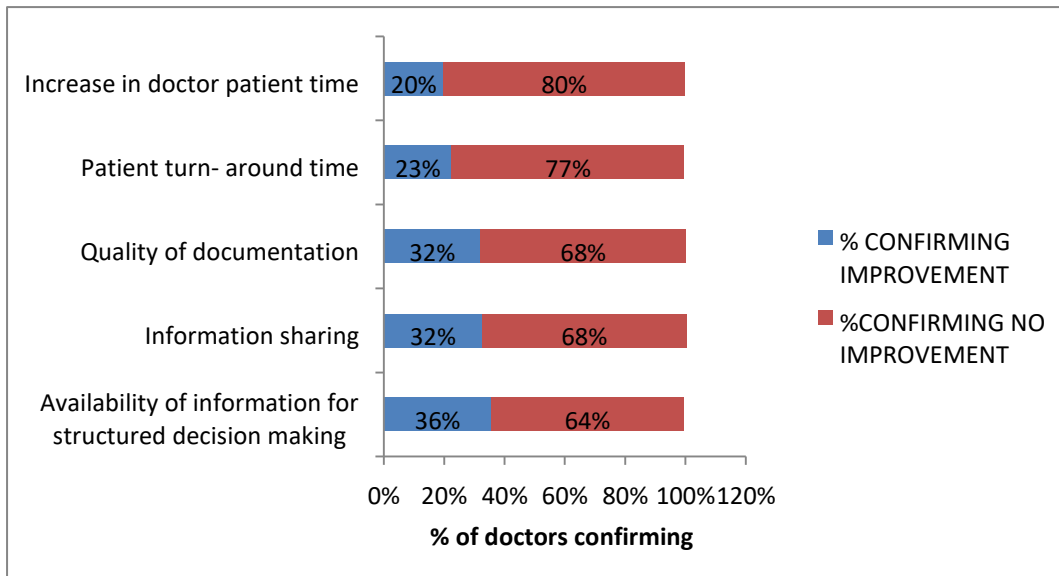


Source: Research data

4.6.2 EMR Impact on Doctors’ Processes

To gauge the impact of EMR on Doctors’ processes, Doctors were asked to rate the EMR performance in terms of increase in doctor patient time, patient turn-around time, quality of documentation, information sharing with other health professional, and availability of information for decision support in patient care. Out of the 83 doctors who responded on these issues, only a small percentage ranging between 20-36% indicated improvement. Majority of the doctors (over 64%) reported that use of EMR had not improved the issues enumerated above (See figure 4.17).

Figure 4.17: Doctors Ratings on EMR Performance

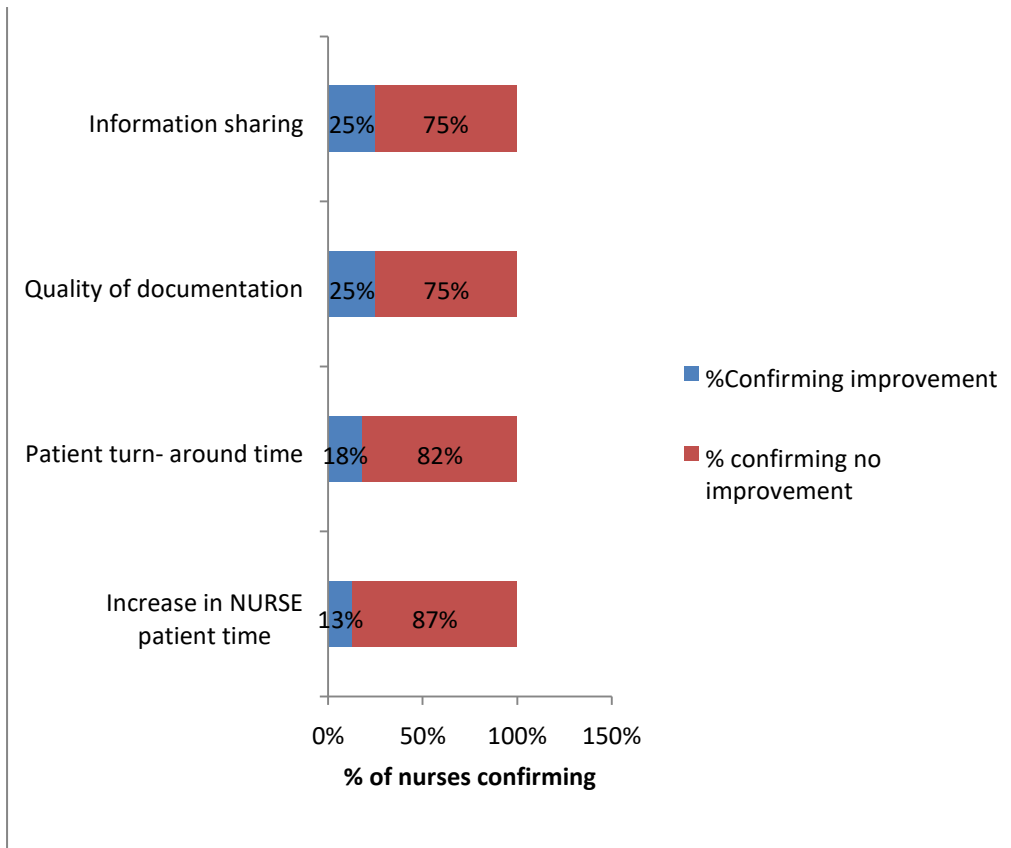


Source: Research data

4.6.3 EMR impact on Nursing processes

The performance of EMR on nursing processes was rated in terms of information sharing with other health professionals, quality of documentation, patient turnaround time in nursing services, and increase in nurse patient time. The ratings on these issues were between 13%-25% meaning that majority of the nurses (over 70%) have not noted any improvement (see figure 4.18).

Figure 4.18: EMR Impact on Nursing Processes



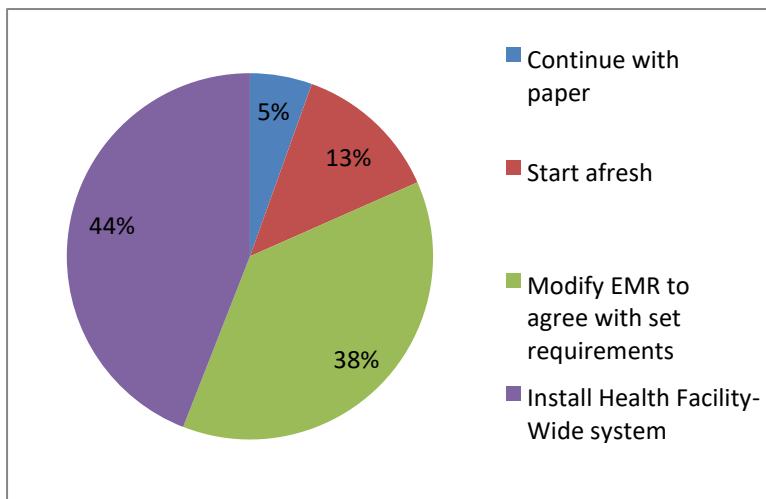
Source: Research data

4.7 EMR Opportunities and Challenges

4.7.1 Recommended Way Forward

In the determination of opportunities for EMR continuity in the Health Facilities, the respondents were asked to recommend the way forward in terms of installation of Health Facility wide EMR, modification of the existing EMR, starting the implementation process afresh, and continue with paper. Forty four (44%) of the 85 EMR users who responded to this issue wanted a Health Facility wide EMR system while 38% felt that the existing EMR should be modified to agree with their requirements meaning that the EMR agenda in Health Facilities has a future. An insignificant number of the respondents (5%) felt that Health facilities should continue with paper (see figure 4.19 for details)

Figure 4.19: Recommended Way Forward for Existing EMRs.

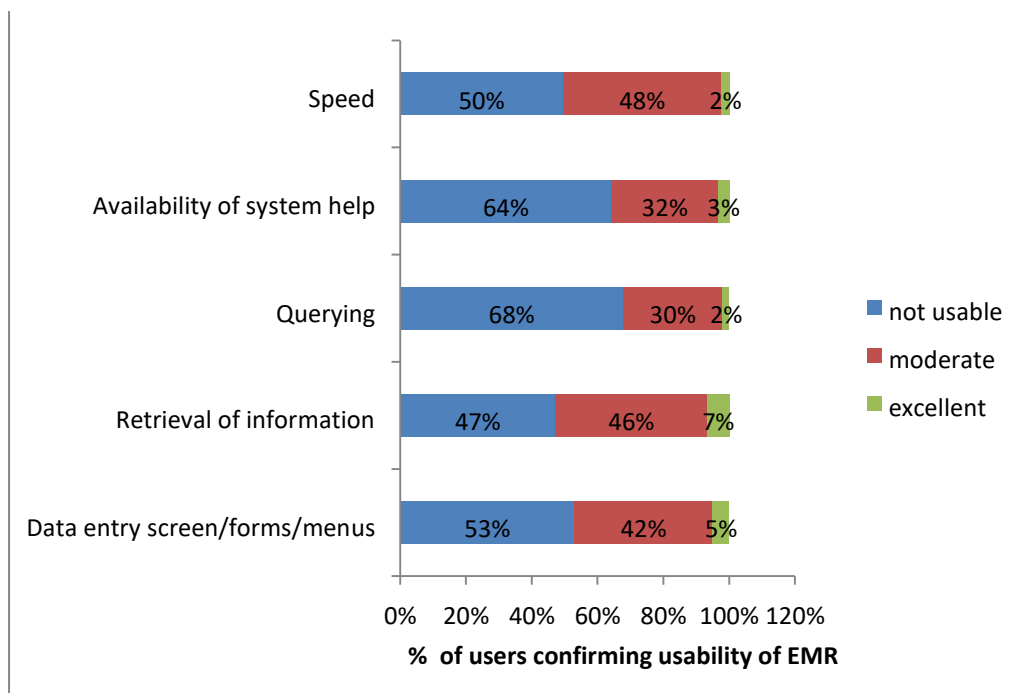


Source: Research data

4.7.2 Usability of EMR

To determine whether there were usability challenges, all the respondents, doctors, nurses, and health records and information officers were asked to comment on EMR speed, systems help, querying, retrieval of information and screens. The responses were rated on a scale of not usable, moderately usable and excellent. Majority of the respondents representing over 64% were not happy with usability of EMR while the rest returned moderate and excellent usability of EMRs (See figure 4.20). The low EMR usability could be attributed to inadequate user training and involvement. This means that more work needs to be done to improve usability of the existing EMRs.

Figure 4.20: Usability of the installed EMRs

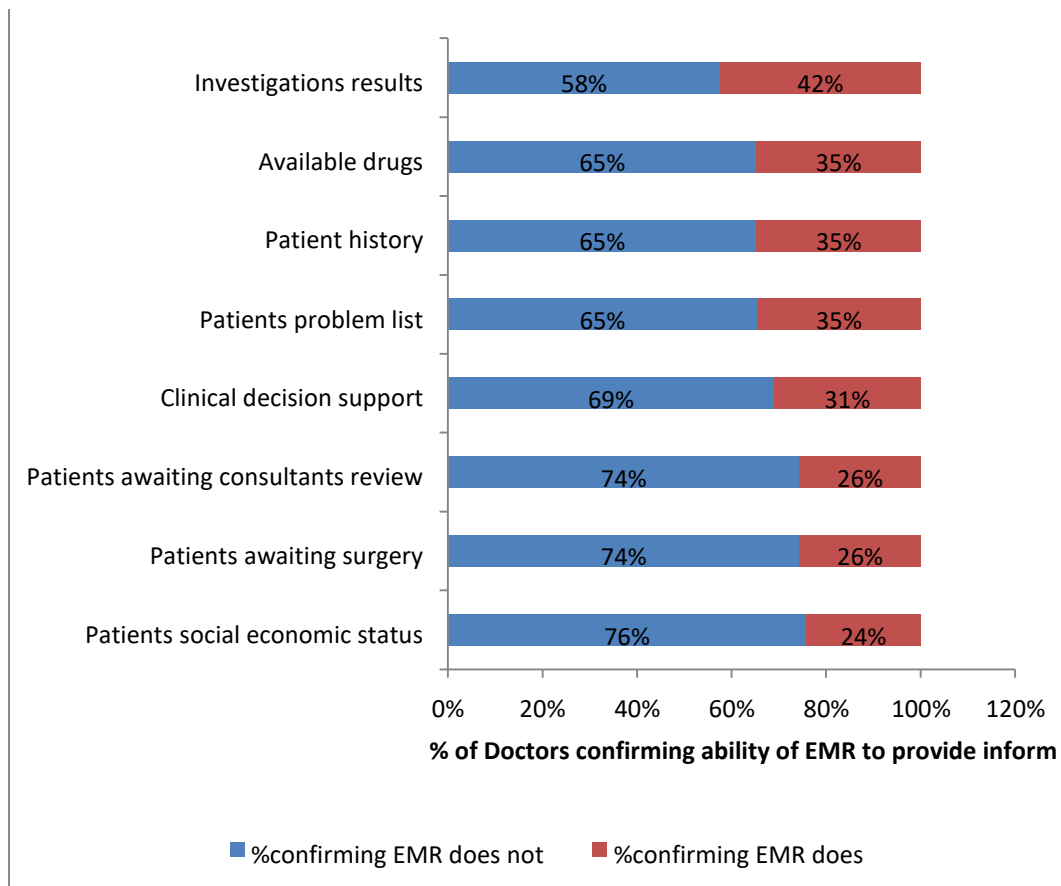


Source: Research data

4.7.3 EMR ability to Provide Clinical Information to Doctors

According to Safran & Goldberg (2000) EMR carries a great potential in healthcare. As a representation of clinical documentation, EMR should allow a collaborative environment that supports workflow, enables new care models and secure access to distributed health data. To assess the challenges that doctors face in this area, doctors were asked to rate the EMRs ability to provide clinical information in on a scale of not applicable, rare, moderate, and extensively. The information items included for selection were investigation results, patients problem list, clinical decision support, available drugs and patient history among others. Majority of the doctors catering for about 70% indicated that EMR does not appropriately provide clinical information meaning that EMR reliability for patient treatment is yet to be realised (See figure 4.21).

Figure 4.21: EMRs Ability to Provide Clinical Information

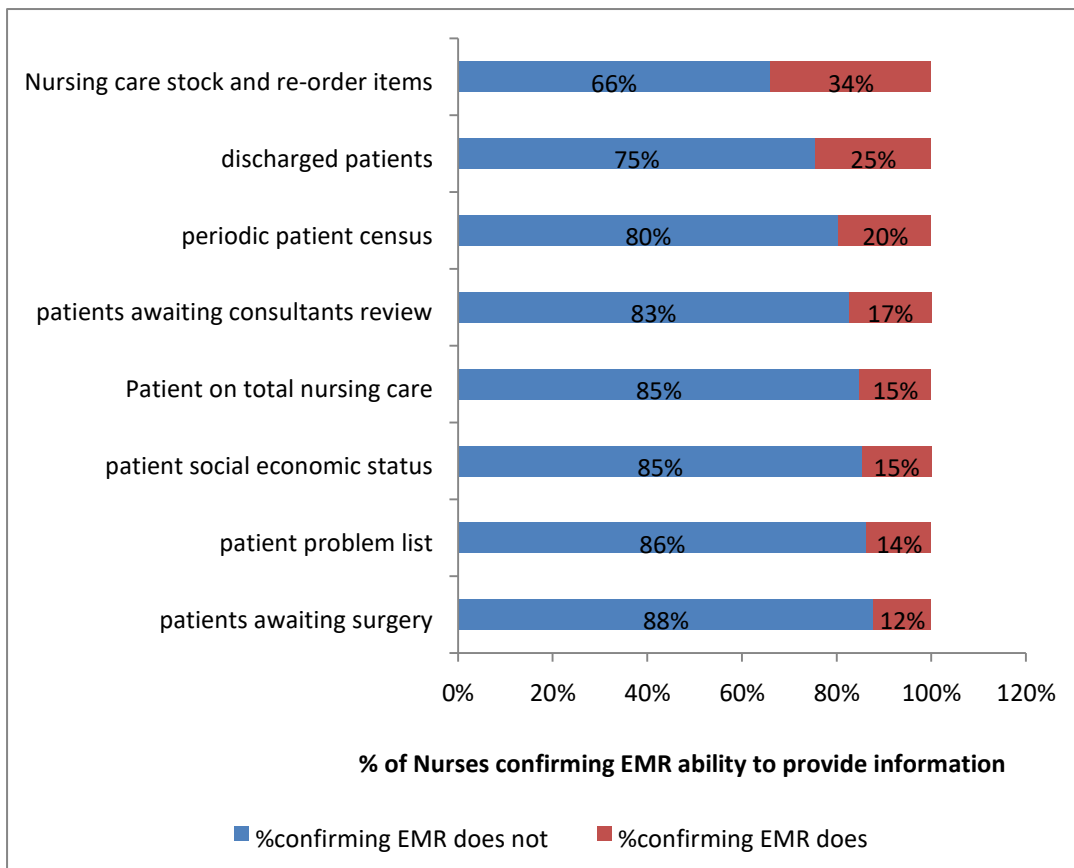


Source: Research data

4.7.4 EMRs Ability to Provide Nursing Care Information

To assess the challenges that nurses face in this area, nurses were asked to rate the EMRs ability to provide vital nursing care information on a scale of rare, moderate and extensively. Responses on rare were treated as inability to provide while the rest were combined to represent able to provide nursing care information. The information items rated were patients on total nursing care, patient census, discharged patients, and patients awaiting consultants review among others. Majority of the nurses catering for over 80% indicated low reliability of EMR as a source of vital nursing care information. This indicates that the potential of EMR as a source of information is yet to be realized (See figure 4.22).

Figure 4.22: EMR Ability to Provide Vital Nursing Care Information

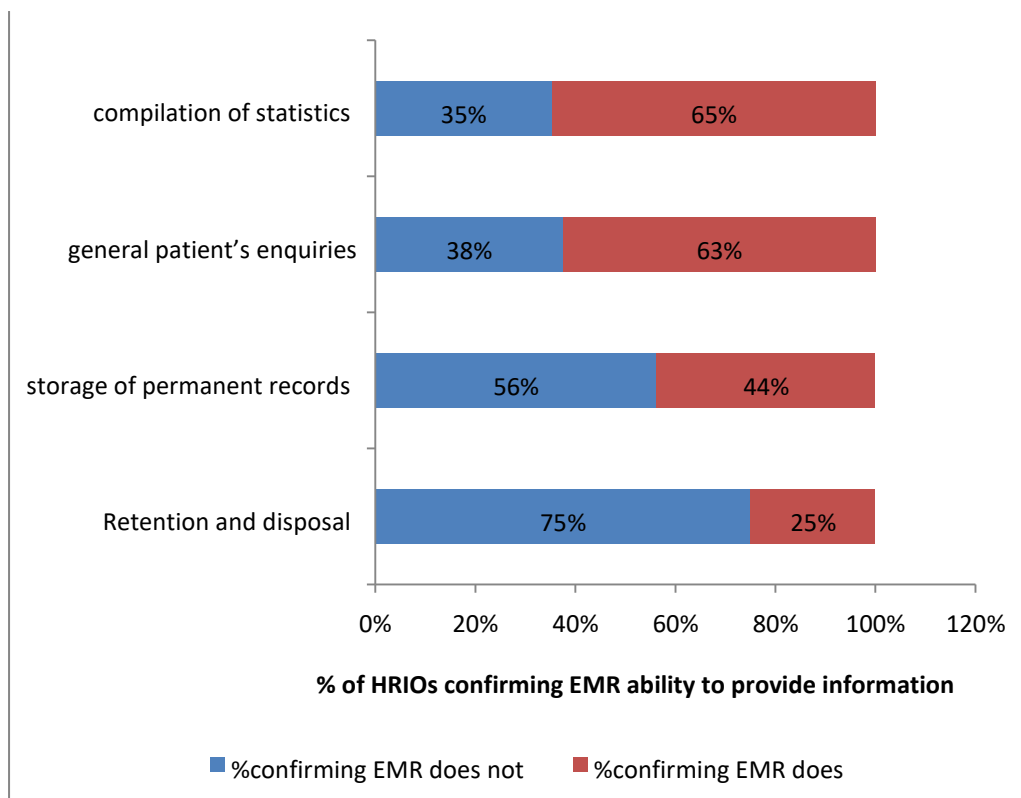


Source: Research data

4.7.5 EMRs Ability to Provide Administrative Statistics and Support for Records Management

Apart from the primary purpose of supporting treatment and follow-up, medical records irrespective of form are also expected to serve as sources of health administrative statistics for hospital planning and management. Another important use of the medical records is providing authentic evidence to assist in determination of medical legal cases as well as responding to other official enquiries on patient treatment. To identify the challenges faced by health information managers in this area, they were asked to rate the extent to which EMR assist in compiling administrative statistics, general patient enquiries, and records storage and disposal. Over 65% confirmed EMRs ability to compile statistics and support for general enquiries while EMRs ability to store and dispose medical records was rated low by majority of the respondents (See figure 4.23). This means that the potential of EMR as a records management system is yet to be realised.

Figure 4.23: EMRs Ability to Provide Statistics and Support for Records Management Function



Source: Research data

4.8 System Design Concept

While at the Ministry of Health Central Registry, it was observed that core records about Health facilities was inadequate and it was not up to date. A challenge of no funds was recorded as this has limited the set up of an automated medical records system.

Therefore, an advanced excel system has been designed by the researcher to be used at the ministry. The system is user friendly and cost effective as well assurance in data backup. The system is to be used on Google Drive cloud base to enhance efficiency and effectiveness in the operations of the Ministry at all times.

The system looks into records concerning information about Health facilities in Uganda in terms of Basic Information (Address, type of facility among others), Utilisation in terms of (number of admissions, services offered among others), Payment sources by patients (Insurance, cash, public services), procurement of equipment (beds, machines, installations), types of surgeries done, revenues and expenditures.

The system will facilitate in fast and reliable decision making by strategic managers, streamlined management and regulation of Health facilities and proper planning of the activities of the Ministry.

A copy of the system has been attached and saved on a Compact Disc to this Report.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section provides a summary of the findings in terms of the challenges being encountered within the various stages of EMR implementation. Conclusions on Assessment of Efficiency and Effectiveness of EMR in Health Facilities are also presented in chapter. The chapter closes with recommendations for further research and on EMR implementation policy.

5.2 Summary

The efforts being made in the implementation of EMR in Health Facilities of Uganda is encouraging. Although there exist various challenges in the operationalization of the EMR systems, feedback from healthcare providers indicated an unstoppable will to move on with EMRs. The challenges and opportunities are summarized below.

In the area of EMR implementation practices, the study noted challenges concerning the planning of activities from pre-implementation, implementation and post-implementation stages. In the planning stage, the key challenges included lack of master plan for EMR, overreliance on limited government funding and low exploration of alternative funding methods for EMR sustainability, low awareness on the existing National EMR standards, lack of information policy at the facility level, and a disconnect between initial planning by strategic managers and actual activation of the activities. Such a disconnect indicates a gap in user involvement and is likely to negatively impact on the process. These challenges are likely to affect evaluation and monitoring of the EMR implementation process.

Despite confirmation by strategic managers that users were being involved, the actual responses from EMR users indicated user involvement gaps in the EMR preparatory stages, choice of technology for medical data capture and analysis, EMR sensitization, testing and piloting. Such gaps are likely to affect EMR ownership and acceptability levels.

As earlier stated, successful EMR should allow access to the patient record 24 hours a day, prevent medication error by providing decision support, support ongoing education for healthcare professionals, timely and effective care, improved hospital revenue, reduced patient-turn-around time, and sharing of information by authorized people. This potential has not been realized in Uganda public Health Facilities. Some of the challenges contributing to

this include concurrent operation of manual, hybrid and electronic medical records system meaning that one has to rely on all for patient care and follow-up. Feedback from the respondents indicated no improvement in doctor patient time, nurse patient time, and patient-turn-around time. Feedback from doctors and nurses indicated EMRs inability to provide information for use during their day to day operations. Lack of such information indicates a gap in the maximization of EMR systems information management opportunities in the Health Facilities.

The general usability of EMR for querying, availability of system help, and its speed received low ratings from the users. However, user interface screens, and retrieval of information were acceptable by a significant number of users. Although the strategic managers had confirmed installation of clinicians modules, the EMRs coverage of doctors processes, such as monitoring of vital signs, prescription, drug administration was rated low. A similar case was noted with nursing where EMR coverage of nursing processes was also rated low. Feedback from health records and information officers indicated that the EMRs do not cover records management functions such as authentic creation of medical records, electronic signatures, retention and disposal of medical records. These gaps indicate a challenge in the identification of EMR requirements in the respective hospital functional areas.

5.3 Conclusions

Public Health Facilities in Uganda face many challenges that are unique to the healthcare providers working there. The importance of the existing electronic medical record systems have at least been recognized despite the challenges being encountered. Appropriate Automated Records System and EMR planning, user engagement, monitoring and evaluation of the implementation process will be the first step in making integrated automated systems workable. Such plans if well activated at implementation stage will eliminate the problems arising from low user involvement, disconnect between strategic managers and users. Appropriate implementation of EMR and system plans will also help in ironing out issues surrounding EMR requirements identification, selection of EMR system and technologies, testing and alignment of the system with healthcare goals such as reduction of turn-around time, decision support, improvement of healthcare, creation of reliable and authentic medical records as well as provision for hospital clinical and administrative statistics. Determination of EMR requirements should be guided by the general medical records primary functions of supporting direct patient care and communication and the secondary functions of medico-

legal record for clinical audit and research, resource allocation, epidemiology, service planning and , Performance monitoring.

To ensure system sustainability, Health Facilities may need to build on the existing EMR modules which have already been shown to work, then add only relevant modules to the system depending on their priorities. The Facilities should identify the most appropriate technology for their EMR due to funding challenges or where possible explore other sources of EMR funding. The experiences of these Health Facilities are an important asset in the determination of the way forward in the system integration at the Ministry's central registry. More monitoring and sensitization is needed to ensure utilization of the existing National EMR standards by public Health Facilities.

5.4 Recommendations

Based on the findings of this research, the following are the recommended corrective measure which can contribute to effective integration of EMRs in Health Facilities with the automated system at the central registry and thus realize the full potential of Effectives and Efficiency in Records management in healthcare.

5.4.1 Policy Recommendations

- I. Adherence to National EMR standards on minimum functional requirements by the Health Facilities should be enhanced through sensitization at both strategic and operational levels.
- II. To achieve the desired integration outcomes, ownership, and appropriate utilisation, users should be involved in all stages from the preparatory stages of requirements identification, systems design, testing, choice of technology, and implementation.
- III. To ensure the privacy of patients, EMRs implementation should adhere to the relevant laws and regulations on disclosure of health information.
- IV. For the EMRs to generate authentic and reliable legal medical records, the Health Facilities should ensure that the EMRs conform to the records management standards on maintenance of documents as evidence.

- V. All EMR stakeholders (clinicians, nurses, health information officers, administrators and ICT staff) need to come together to strategize the inclusion of electronic medical records retention and disposal schedule in the EMR systems for control of retention for temporary and permanent medical records.

- VI. The overall design of the automated system should lay more emphasis on improvement of healthcare services. The systems should focus on support for patient treatment and follow-up as well as information for Health Facility administration and quality monitoring.

5.4.2 Recommendations for further research

1. To ensure EMR cost effectiveness, early corrective and control measures, and realisation of a positive impact on healthcare, a before and after study is recommended in hospitals intending to implement EMR system in Uganda.

2. More research work is needed in the area of EMR system usability, efficiency and acceptability in order to measure accurately the extent to which these systems impact on clinicians patient time.

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APPENDICES

APPENDIX I: INTERVIEW GUIDE

MAKERERE UNIVERSITY

EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCE

TO THE RECORDS MANAGER

APPENDIX I: INTERVIEW GUIDE FOR CENTRAL REGISTRY STAFF

INTRODUCTION

Good morning / Good after noon, am Abakwatse Shallon, a student from Makerere University pursuing a degree in Records and Archives Management (BRAM). As part of the program, I am conducting a research study on the topic “**Designing an Automated Records System for Active Records at the Ministry of Health Central Registry**”. I am kindly requesting you to assist me by completing the following Questions. The interview will take only 40 minutes. Before we go further, I would like to assure you that your responses will be treated confidentially and used for academic purposes only. Thank you.

Objectives of the study

The general objective is to design an Automated Records System for Active Records at Ministry of Health Central Registry

Specific Objectives

- i) To find out the different types of records for active records at ministry of health central registry
- ii) To identify the advantages of the different records for active records at ministry of health central registry
- iii) To find out the challenges facing the management of active records at ministry of health central registry
- iv) To design an automated records system for active records at ministry of health central registry

SECTION A: BACK GROUND INFORMATION.

1. Sex

a) Female

b) Male

2. Age of the respondent

- a) 20 -30 b) 31- 40 c) 41-50

3. What is your religion?

- a) Catholic
b) protestant
c) Muslim
d) Adventist
e) Traditional
f) Others specify.....

4. What is your Educational level?

- a) PhD b) Masters' degree c) Bachelors' degree
d) Tertiary education e) others

(f) If other specify.....

5. What is your marital status?

- a) Married
b) Widowed
c) Separated
d) None

6. What is your Job title.....

7. How long have you worked with the ministry of health central registry?

- a) 2 years and below
b) 2 - 6 years
c) 6 - 10 years
d) 10 -14 years
e) Over 14 years

SECTION B: DESIGNING AN AUTOMATED RECORDS SYSTEM FOR ACTIVE RECORDS

1. What types of records are kept at the ministry of health central registry?
2. What is the method of storing and retrieving of records is used at the ministry of health central registry?
3. How are the records stored and retrieved at the ministry of health central registry?
4. What are the records storage equipment in place at the ministry of health central registry?
5. What are the challenges facing the management of active records at ministry of health central registry?
6. What strategies can be put in place to improve on the management of active records in the central registry?

Thank you for participating in the interview

APPENDIX II: OBSERVATION GUIDE

- 1) The types of records kept at the ministry of health central registry
- 2) The types of record storage and retrieval system used at the ministry of health central registry
- 3) The methods used for record storage and retrieval at the ministry of health central registry
- 4) Observation of the challenges associated with the management of active records at ministry of health central registry?

**APPENDIX III
QUESTIONNAIRE FOR DOCTORS**

SECTION 1: EXISTING EMR FEATURES

1. Please **tick (√)** the type(s) of medical record systems being used in the list below.

- i) Paper
- ii) Hybrid(Paper and electronic)
- iii) Electronic(disease specific e.g. HIV)
- iv) Electronic (for all diseases/conditions)
- v) None

2. Please **tick (√)** the computerized clinical processes in the following list.

- i) Vital signs monitoring
- ii) Patient examination
- iii) Ordering of investigations
- iv) Drug administration
- v) Prescribing
- vi) Consultations/patient referral
- vii) Surgery scheduling
- viii) Communication with other service points
- ix) Discharges
- x) Communication with patients relatives
- xi) Structured clinical decision support

Others specify_____

xii) Please **tick(√)** in the list below the medical forms that are computerized in the hospital

- i) Registration
- ii) Doctors Notes
- iii) Nursing notes
- iv) Lab
- v) X-ray
- vi) Prescription
- vii) Vital sign
- viii) Case summary

- ix) Patient Charge sheets ()
- x) Partograph ()
- xi) Baby Score ()
- xii) Blood matching ()

SECTION2: INVOLVEMENT IN THE PRE-IMPLEMENTATION STAGE

xiii) Circle the answer that best indicate the extent to which doctors were involved in each of the following pre-implementation stages

	Not involved		slightly moderate		Fully involved		
	0	1	2	3	4	5	6
EMR feasibility	0	1	2	3	4	5	6
Planning	0	1	2	3	4	5	6
Identification of EMR							
Champions	0	1	2	3	4	5	6
Introduction to EMR concept	0	1	2	3	4	5	6
Requirements identification	0	1	2	3	4	5	6
Priority setting	0	1	2	3	4	5	6
Mobilization of resources	0	1	2	3	4	5	6
Sensitization on existing EMR policies	0	1	2	3	4	5	6

SECTION 3: IMPLEMENTATION

xiv) Tick in the following list the methods that best represent how patient data is entered.

- i) Captured on paper first and entered later by data personnel
- ii) Captured real time at the point of service by doctor
- iii) Captured both on paper and online at the point of service by doctor

xv) Using the scale provided, please circle the answer that best indicates the use of each of the following technologies for patient identification and data capture.

	N/A	Rare		Moderate		Extensively	
	0	1	2	3	4	5	6
Bar code	0	1	2	3	4	5	6
Magnetic card readers	0	1	2	3	4	5	6

Smart card readers	0	1	2	3	4	5	6
Speech recognition	0	1	2	3	4	5	6
Biometric	0	1	2	3	4	5	6

xvi) Using the scale provided, circle the answer that best indicate the use of each of the following technologies for healthcare data capture.

	N/A	Rare		Moderate		Extensively	
Paper scanning/ OCR	0	1	2	3	4	5	6
Tablets	0	1	2	3	4	5	6
Ipads	0	1	2	3	4	5	6
Mobile Phones	0	1	2	3	4	5	6
Audio/Video Capture	0	1	2	3	4	5	6
Direct by medical devices	0	1	2	3	4	5	6
Computers	0	1	2	3	4	5	6

xvii) Using the scale provided below, circle the answer that best indicate the extent to which doctors were involved in choosing the technology for health data capture, processing, storage and retrieval.

Not at all							Very much
0	1	2	3	4	5	6	7

xviii) Circle the answer that best indicate the extent to which doctors were involved in each of the following implementation issues

	Not at all		slightly moderated		fully		
Purchase and distribution of Computers	0	1	2	3	4	5	6
Testing of the EMR system	0	1	2	3	4	5	6
User training on EMR use	0	1	2	3	4	5	6
Piloting	0	1	2	3	4	5	6
Selecting method of implementation	0	1	2	3	4	5	6

SECTION 4: USER PERCEPTIONS ON POST-IMPLEMENTATION ISSUES, IMPACT ON PATIENT CARE AND WAY FORWARD

xix) Circle the answer that best indicate the extent to which EMR has impacted on each of the following healthcare areas

	Not improved		Slightly	Better	Greatly improved		
Patient turn- around time	0	1	2	3	4	5	6
Increase in doctor patient time	0	1	2	3	4	5	6
Quality of documentation	0	1	2	3	4	5	6
Information sharing	0	1	2	3	4	5	6
Availability of information							
For structured clinical decision	0	1	2	3	4	5	6

xx) Circle the answer that best indicate the extent to which EMR support is provided in each of the following areas.

	Not at all			Extensively			
Availability of technicians	0	1	2	3	4	5	6
EMR modifications	0	1	2	3	4	5	6
When system is down	0	1	2	3	4	5	6
Continuity training	0	1	2	3	4	5	6

xxi) Please tick what you would recommend for the way forward in the list below

- i) Continue with paper
- ii) Modify EMR to agree with set requirements
- iii) Start afresh
- iv) Install hospital-wide system

SECTION 5: USER SATISFACTION WITH EMR OUTPUT

xxii) Please **circle** the answer that best indicate the extent to which the EMR provide each of the following patient care information.

	N/A	Rare	moderate		Extensively		
Investigations results	0	1	2	3	4	5	6
Patients problem list	0	1	2	3	4	5	6
Clinical decision support	0	1	2	3	4	5	6

Available drugs	0	1	2	3	4	5	6
Patients awaiting surgery	0	1	2	3	4	5	6
Patients social economic status	0	1	2	3	4	5	6
Patients awaiting consultants review	0	1	2	3	4	5	6
Patient history	0	1	2	3	4	5	6

xxiii) Please circle the answer that best indicate the level of user friendliness of the EMR in each of the following areas.

		Not Usable		moderate		Excellent	
Data entry screen/forms/menus	0	1	2	3	4	5	6
Retrieval of information	0	1	2	3	4	5	6
Querying	0	1	2	3	4	5	6
Availability of system help	0	1	2	3	4	5	6
Speed	0	1	2	3	4	5	6

xxiv) Using the scale below circle the answer that best indicate the extent to which medical record is computerized in your hospital.

	Not at all							Very much
	0	1	2	3	4	5	6	7

THANK YOU FOR TAKING YOUR TIME TO FILL THIS QUESTIONNAIRE

APPENDIX IV

QUESTIONNAIRE FOR NURSES

SECTION 1: EXISTING EMR FEATURES

xxv) Please **tick (√)** the type(s) of medical record systems being used in the list below.

- i) Paper
- ii) Hybrid(Paper and electronic)
- iii) Electronic(disease specific e.g. HIV)
- iv) Electronic(for all diseases/conditions)
- v) None

xxvi) Please **tick (√)** the computerized nursing care processes in the following list.

- i) Vital signs monitoring
- ii) Nursing care services
- iii) Nursing duties allocation
- iv) Drug administration
- v) Nursing care supplies & ordering
- vi) Inpatient transfer
- vii) Surgery scheduling
- viii) Communication with doctor
- ix) Discharges
- x) Communication with patients relatives

Others specify _____

xxvii) Please **tick(√)** in the list below the medical forms that are computerized in the hospital

- i) Registration
- ii) Doctors Notes
- iii) Nursing notes
- iv) Lab
- v) X-ray
- vi) Prescription
- vii) Vital sign

- viii) Case summary ()
- ix) Patient Charge sheets ()
- x) Partograph ()
- xi) Baby Score ()
- xii) Blood matching ()

SECTION2: INVOLVEMENT IN THE PRE-IMPLEMENTATION STAGE

xxviii) Circle the answer that best indicate the extent to which nurses were involved in each of the following pre-implementation stages

	Not involved slightly moderate fully involved						
EMR feasibility	0	1	2	3	4	5	6
Planning	0	1	2	3	4	5	6
Identification of EMR							
Champions	0	1	2	3	4	5	6
Introduction to EMR concept	0	1	2	3	4	5	6
Requirements identification	0	1	2	3	4	5	6
Priority setting	0	1	2	3	4	5	6
Mobilization of resources	0	1	2	3	4	5	6
Sensitization on existing EMR policies	0	1	2	3	4	5	6

SECTION 3: IMPLEMENTATION

xxix) Tick in the following list the methods that best represent how patient data is entered.

- i) Captured on paper first and entered later by data personnel
- ii) Captured real time at the point of service by nurses

xxx) Using the scale provided, please circle the answer that best indicates the use of each of the following technologies for patient identification and data capture.

	N/A	Rare		Moderate		Extensively	
Bar code	0	1	2	3	4	5	6
Magnetic card readers	0	1	2	3	4	5	6
Smart card readers	0	1	2	3	4	5	6

Speech recognition	0	1	2	3	4	5	6
Biometric	0	1	2	3	4	5	6

xxxii) Using the scale provided, circle the answer that best indicate the use of each of the following technologies for healthcare data capture.

	N/A	Rare	Moderate		Extensively		
Paper scanning/ OCR	0	1	2	3	4	5	6
Tablets	0	1	2	3	4	5	6
Ipads	0	1	2	3	4	5	6
Mobile Phones	0	1	2	3	4	5	6
Audio/Video Capture	0	1	2	3	4	5	6
Direct by medical devices	0	1	2	3	4	5	6
Computers	0	1	2	3	4	5	6

xxxiii) Use the provided circle the answer that best indicate the extent to which you were involved in choosing the technology for health data capture, processing, storage and retrieval.

Not at all				Very much			
0	1	2	3	4	5	6	7

xxxiii) Circle the answer that best indicate the extent to which nurses were involved in each of the following implementation issues

	Not at all		slightly	moderate	fully		
Purchase and distribution of Computers	0	1	2	3	4	5	6
Testing of the EMR system	0	1	2	3	4	5	6
User training on EMR use	0	1	2	3	4	5	6
Piloting	0	1	2	3	4	5	6
Selecting method of implementation	0	1	2	3	4	5	6

SECTION 4: USER PERCEPTIONS ON POST-IMPLEMENTATION ISSUES, IMPACT ON PATIENT CARE AND WAY FORWARD

xxxiv) Circle the answer that best indicate the extent to which EMR has impacted on each of the following healthcare areas

		Not improved	Slightly Better	Greatly improved			
Patient turn- around time	0	1	2	3	4	5	6
Increase in nurse patient time	0	1	2	3	4	5	6
Quality of documentation	0	1	2	3	4	5	6
Information sharing	0	1	2	3	4	5	6

xxxv) Circle the answer that best indicate the extent to which EMR support is provided in each of the following areas.

		Not at all				extensively	
Availability of technicians	0	1	2	3	4	5	6
EMR modifications	0	1	2	3	4	5	6
When system is down	0	1	2	3	4	5	6
Continuity training	0	1	2	3	4	5	6

SECTION 5: USER SATISFACTION WITH EMR OUTPUT

xxxvi) Please **circle** the answer that best indicate the extent to which the EMR provide each of the following nursing care information.

		N/A	Rare		moderate	Extensively	
Patients on total nursing care	0	1	2	3	4	5	6
Patients problem list	0	1	2	3	4	5	6
Periodic patient census	0	1	2	3	4	5	6
Discharged patients	0	1	2	3	4	5	6
Patients awaiting surgery	0	1	2	3	4	5	6
Patients social economic status	0	1	2	3	4	5	6
Patients awaiting consultants review	0	1	2	3	4	5	6
Nursing care stock and re-order Items	0	1	2	3	4	5	6

xxxvii) Please circle the answer that best indicate the level of user friendliness of the EMR in each of the following areas.

		Not Usable	moderate			Excellent		
Data entry screen/forms/menus	0	1	2	3	4	5	6	
Retrieval of information	0	1	2	3	4	5	6	
Querying	0	1	2	3	4	5	6	
Availability of system help	0	1	2	3	4	5	6	
Speed	0	1	2	3	4	5	6	

xxxviii) Using the scale below circle the answer that best indicate the extent to which medical record is computerized in your hospital.

Not at all					Very much		
0	1	2	3	4	5	6	7

THANK YOU FOR TAKING YOUR TIME TO FILL THIS QUESTIONNAIRE

APPENDIX V
QUESTIONNAIRE FOR HEALTH INFORMATION OFFICERS

SECTION 1: EXISTING EMR FEATURES

xxxix) Please **tick (√)** the type(s) of medical record systems being used in the list below.

- i) Paper
- ii) Hybrid(Paper and electronic)
- iii) Electronic(disease specific e.g HIV)
- iv) Electronic(for all diseases/conditions)
- v) None

xl) Please **tick (√)** the computerized medical records management processes in the following list.

- i) General patients enquiries
- ii) Registration
- iii) Appointments
- iv) Admission
- v) Electronic signatures
- vi) Records access and security
- vii) Records disposal
- viii) Permanent records storage
- ix) Discharges
- x) Compilation of morbidity and mortality
- xi) Compilation of OP and IP attendances
- xii) Authentic creation and maintenance medical record

Others specify _____

xli) Please **tick(√)** in the list below the medical forms that are computerized in the hospital

- i) Registration
- ii) Doctors Notes
- iii) Nursing notes
- iv) Lab
- v) X-ray

- vi) Prescription
- vii) Vital sign
- viii) Case summary
- ix) Patient Charge sheets
- x) Partograph
- xi) Baby Score
- xii) Blood matching

SECTION 2: INVOLVEMENT IN THE PRE-IMPLEMENTATION STAGE

xlii) Circle the answer that best indicate the extent to which health information officers were involved in each of the following pre-implementation stages

	Not involved		slightly moderate			Fully involved	
EMR feasibility	0	1	2	3	4	5	6
Planning	0	1	2	3	4	5	6
Identification of EMR							
Champions	0	1	2	3	4	5	6
Introduction to EMR concept	0	1	2	3	4	5	6
Requirements identification	0	1	2	3	4	5	6
Priority setting	0	1	2	3	4	5	6
Mobilization of resources	0	1	2	3	4	5	6
Sensitization on existing							
EMR policies	0	1	2	3	4	5	6

SECTION 3: IMPLEMENTATION

xliii) Tick in the following list the methods that best represent how patient data is entered.

- i) Captured on paper first and entered later by data personnel
- ii) Captured real time at the point of service
- iii) Captured both on paper and online at the point of service

xliv) Using the scale provided, please circle the answer that best indicates the use of each of the following technologies for patient identification and data capture.

	N/A	Rare		Moderate		Extensively	
Bar code	0	1	2	3	4	5	6
Magnetic card readers	0	1	2	3	4	5	6
Smart card readers	0	1	2	3	4	5	6
Speech recognition	0	1	2	3	4	5	6
Biometric	0	1	2	3	4	5	6

xliv) Using the scale provided, circle the answer that best indicate the use of each of the following technologies for healthcare data capture.

	N/A	Rare	Moderate		Extensively		
Paper scanning/ OCR	0	1	2	3	4	5	6
Tablets	0	1	2	3	4	5	6
Ipads	0	1	2	3	4	5	6
Mobile Phones	0	1	2	3	4	5	6
Audio/Video Capture	0	1	2	3	4	5	6
Direct by medical devices	0	1	2	3	4	5	6
Computers	0	1	2	3	4	5	6

xlvi) Using the scale provided below, circle the answer that best indicate the extent to which health information officers were involved in choosing the technology for health data capture, processing, storage and retrieval.

Not at all

Very much

0 1 2 3 4 5 6 7

xlvii) Circle the answer that best indicate the extent to which health information officers were involved in each of the following implementation issues

	Not at all		slightly	moderate		fully	
Purchase and distribution of Computers	0	1	2	3	4	5	6
Testing of the EMR system	0	1	2	3	4	5	6
User training on EMR use	0	1	2	3	4	5	6
Piloting	0	1	2	3	4	5	6
Selecting method of implementation	0	1	2	3	4	5	6

SECTION 4: USER PERCEPTIONS ON POST-IMPLEMENTATION ISSUES, IMPACT ON PATIENT CARE AND WAY FORWARD

xlvi) Circle the answer that best indicate the extent to which EMR has impacted on each of the following healthcare areas

	Not improved	Slightly	Better	Greatly improved			
Patient turn- around time	0	1	2	3	4	5	6
Retention and disposal of Record	0	1	2	3	4	5	6
Authentic creation of records	0	1	2	3	4	5	6
Information sharing	0	1	2	3	4	5	6
Security of medical record	0	1	2	3	4	5	6
Compilation of medical statistics	0	1	2	3	4	5	6
Availability of information for research	0	1	2	3	4	5	6

xlix) Circle the answer that best indicate the extent to which EMR support is provided in each of the following areas.

	Not at all				extensively		
Availability of technicians	0	1	2	3	4	5	6
EMR modifications	0	1	2	3	4	5	6
When system is down	0	1	2	3	4	5	6
Continuity training	0	1	2	3	4	5	6

l) Please tick what you would recommend for the way forward in the list below

- i) Continue with paper
- ii) Modify EMR to agree with set requirements
- iii) Start afresh
- iv) Install hospital-wide system
- v) Improve statistical reporting
- vi) Improve on authenticity of EMR (eg electronic signatures)
- vii) improve on security of EMR

SECTION 5: USER SATISFACTION WITH EMR OUTPUT

li) Please **circle** the answer that best indicate the extent to which the EMR provide each of the following records management services.

	N/A	Rare	moderate	Extensively			
Retention and disposal	0	1	2	3	4	5	6
Storage of permanent records	0	1	2	3	4	5	6
Compilation of statistics	0	1	2	3	4	5	6
General patient enquiries	0	1	2	3	4	5	6

lii) Please circle the answer that best indicate the level of user friendliness of the EMR in each of the following areas.

	Not Usable	moderate			Excellent		
Data entry screen/forms/menus	0	1	2	3	4	5	6
Retrieval of information	0	1	2	3	4	5	6
Querying	0	1	2	3	4	5	6
Availability of system help	0	1	2	3	4	5	6
Speed	0	1	2	3	4	5	6

liii) Using the scale below circle the answer that best indicate the extent to which medical record is computerized in your hospital.

Not at all								Very much	
0	1	2	3	4	5	6	7		

THANK YOU FOR TAKING YOUR TIME TO FILL THIS QUESTIONNAIRE

APPENDIX VI

QUESTIONNAIRE FOR STRATEGIC MANAGERS SECTION 1: GENERAL FACILITY INFORMATION

1. Tick (✓) your hospitals classification level in the list below

- i) Level 1
- ii) Level 2
- iii) Level 3
- iv) Level 4
- v) Level 5
- vi) Level 6

2. Please fill in the following infrastructure details

Total no of staff _____ No of beds _____ No of theatre rooms _____
No of Out-patients per day _____ No of admissions per day _____

3. Tick (✓) the services offered in your facility in the list provided below

(a) *Out Patient*

- i) Adult emergency services
- ii) Paediatric emergency services
- iii) Consultant clinics
- iv) Comprehensive HIV Care Clinic

(b) *Inpatient services*

- i. Obs/Gynae
- ii. Paediatrics
- iii. Medical
- iv. Surgical

(c) *Specialized services*

- i) Intensive care unit
- ii) Renal dialysis
- iii) New born ICU
- iv) Cancer treatment

(d) *Diagnostic services*

- i) Ordinary lab tests

- ii) Specialized lab tests
- iii) Ordinary X-rays
- iv) Specialized X-rays
- v) Endoscopy

Others specify _____

SECTION 2: COMPUTER BASED SYSTEMS AVAILABLE IN THE HEALTH FACILITY

4. Please tick (√) the system or systems already installed in the list provided below
- i) Patient registration
 - ii) Clinicians/doctors system
 - iii) Nursing system
 - iv) Medical Investigations ordering and reporting
 - v) HIV care system
 - vi) Billing system
 - vii) Telemedicine system
 - viii) Inventory
 - ix) Finance back office

SECTION 3: EMR-STRATEGY

5. Please tick(√) whether each of the following documents is available in your facility or not

	Available	Not available
Facility strategic plan	—	—
Clinical performance contracts	—	—
EMR implementation master plan	—	—
EMR specifications document	—	—
National EMR standards	—	—
National health information policy	—	—
Institutional information policy	—	—

6. Using the scale provided below, circle the answer that best represent the extent to which strategic consideration in EMR planning was taken in each of the following areas

	Not at all	Slight	Extensively
	0	1	2 3 4
(a) <i>Funding</i>			
Availability of government funding	0	1	2 3 4

Internally raised revenue	0	1	2	3	4
Donor sourcing	0	1	2	3	4
Partnership	0	1	2	3	4
<i>(b) Information management</i>					
Information sharing and security	0	1	2	3	4
Medical legal issues	0	1	2	3	4
Permanent health information storage	0	1	2	3	4
Disposal of medical records	0	1	2	3	4
Digitization of paper records	0	1	2	3	4
Integration of EMR with medical devices	0	1	2	3	4
Making work easy	0	1	2	3	4
Appropriate data capture equipment for doctors	0	1	2	3	4
EMR testing	0	1	2	3	4
<i>(c) User involvement</i>					
Initial training and Introduction to EMR concept	0	1	2	3	4
Establishment of EMR user committees	0	1	2	3	4
Requirements identification(data capture, Processing, reporting, querying etc)	0	1	2	3	4
Choosing technology for data capture, Processing, reporting, querying etc)	0	1	2	3	4
EMR procurement	0	1	2	3	4
EMR System testing	0	1	2	3	4

7. Using the scale provided below, circle the answer that best represent the extent to which the EMR system vendors adhere to recommended EMR standards

Not at all	Slightly	moderate	Extensively
0 1	2 3	4 5	6 7

SECTION 4: IMPLEMENTATION

8. Tick in the following list the methods that best represent how patient data is entered.

- i) Captured on paper first and entered later by data personnel
- ii) Captured real time at the point of service

9. Using the scale provided, please circle the answer that best indicates the use of each of the following technologies for patient identification and data capture.

	N/A	Rare	Moderate		Extensively			
Bar code	0	1	2	3	4	5	6	
Magnetic card readers	0	1	2	3	4	5	6	
Smart card readers	0	1	2	3	4	5	6	
Speech recognition	0	1	2	3	4	5	6	
Biometric	0	1	2	3	4	5	6	

10. Using the scale provided, circle the answer that best indicate the use of each of the following technologies for healthcare data capture.

	N/A	Rare	Moderate		Extensively			
Paper scanning/ OCR	0	1	2	3	4	5	6	
Tablets	0	1	2	3	4	5	6	
Ipads	0	1	2	3	4	5	6	
Mobile Phones	0	1	2	3	4	5	6	
Audio/Video Capture	0	1	2	3	4	5	6	
Direct by medical devices	0	1	2	3	4	5	6	
Computers	0	1	2	3	4	5	6	

11. Using the scale provided, circle the answer that best represent the extent to which each one of the following affect implementation of EMR in your facility

	Not at all		slightly		moderate		Extensively	
	0	1	2	3	4	5	6	7
Budget	0	1	2	3	4	5	6	7
Technical capacity	0	1	2	3	4	5	6	7
User training	0	1	2	3	4	5	6	7
Medical legal aspect of patient data	0	1	2	3	4	5	6	7
Existing ICT policy	0	1	2	3	4	5	6	7
Techno-phobia	0	1	2	3	4	5	6	7
Politics	0	1	2	3	4	5	6	7
Fear of the unknown	0	1	2	3	4	5	6	7

SECTION 5: SATISFACTION WITH EMR OUTPUT

12. Please **circle** the answer that best indicate the extent to which the EMR provide each of the following management information.

	N/A	Rare	moderate	Extensively			
Hospital workload summaries	0	1	2	3	4	5	6
Hospital clinical performance indicators	0	1	2	3	4	5	6
Discharged patients	0	1	2	3	4	5	6
Workflow data	0	1	2	3	4	5	6

12. Using the scale below circle the answer that best indicate the extent to which the hospital is computerized.

Not at all								Very much	
0	1	2	3	4	5	6	7		

THANK YOU FOR TAKING YOUR TIME TO FILL THIS QUESTIONNAIRE

APPENDIX VII DOCUMENT REVIEW FORM

DOCUMENT NAME	USERS	PURPOSE

APPENDIX VIII:RCORDS SHELVES AT MINISTRY OF HEALTH

